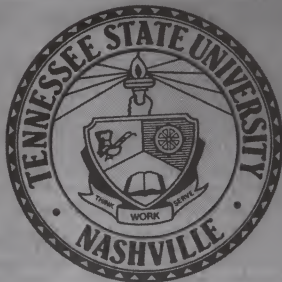


**MENTAL HEALTH SERVICE UTILIZATION AMONG
MEDICARE ELDERLY IN TENNESSEE: THE EFFECT
OF RACE, SOCIAL CLASS,
AND COMORBIDITY**

FINAL REPORT

**FUNDED BY
HEALTH CARE FINANCING ADMINISTRATION**



**BAQAR A. HUSAINI, Ph.D.
Center For Health Research
Tennessee State University**

1999

**MENTAL HEALTH SERVICE UTILIZATION
AMONG MEDICARE ELDERLY IN TENNESSEE :
THE EFFECT OF RACE, SOCIAL CLASS, AND COMORBIDITY**

**By Baqar A. Husaini, Principal Investigator,
Robert Levine, Oscar Miller, Van A. Cain, J.R. Newbrough,
W. Thomas Summerfelt, Kathryn Anderson, Charles Holzer,III,
Myron Burns, Deborah Pitts**

Federal Project Officer: Richard Bragg

**Center for Health Research
Tennessee State University**

HCFA GRANT # 20-C-90705/4;

September, 1999

The statements contained in this report are solely those of the authors and do not necessarily reflect the views or policies of the Health Care Financing Administration. The contractor assumes responsibility for the accuracy and completeness of the information contained in this report.

Table of Contents

Abstract.....	1
Executive Summary	3
Findings.....	4
Factors Related to Diagnosis and Service Utilization	5
Implications For Research	12
Implications For Policy And Program	13
Limitations Of The Study	15
Preface	17
Chapter 1: Introduction.....	19
Specific Aims	20
Significance Of The Study	20
Issues of Need, Mental Comorbidity, And Use of Mental Health Services: A Literature Review	21
Issue of Need For Services:	21
Issue of Mental Comorbidity:	22
Use Of Mental Health Services	23
Summary	25
Chapter 2: Methodology	27
Description of Sample	27
Other Demographic Variables.....	29
Summary and Discussion.....	33
Chapter 3: Race, Diagnoses, And Service Utilization	35
Introduction	35
Race and Psychiatric Disorders	15
Psychopathology among Medicare Elderly	36
Race and Specific Diagnoses	37
Race and Service Utilization	39
Race and Specialty Providers.....	41
Summary and Discussion.....	42
Chapter 4: Gender, Age, And Service Utilization	43
Gender and Chronic Medical Conditions	43
Gender and Service Utilization	44
Gender and Cost of Specific Medical Conditions	46

Gender and Mental Disorders	46
Gender and Service Utilization	47
Gender and Cost of Mental Services	48
Summary and Discussion.....	48
Mental Disorders and Age Categories	49
Specific Psychiatric Disorders by Age Categories	50
Service Utilization by Age Categories.....	51
Healthcare Costs by Age Categories	53
Summary and Discussions	54
 Chapter 5: Social Class, Mental Illness and Service Utilization	57
Social Class and Mental Illness	57
Creating an Index of Social Class: Data Analysis.....	58
Linkage of Medicare Data and Census Data.....	58
Social Class and Prevalence of Psychiatric Disorders.....	59
Social Class, Race, and Service Utilization	62
Social Class and Health Care Costs.....	67
Summary and Discussions	69
 Chapter 6: Mental Comorbidity and Service Utilization.....	71
Concept of Comorbidity	71
Health and Mental Health Comorbidity.....	71
Substance Disorder and Mental Health Comorbidity	72
Mental Comorbidity among Medicare Elderly	72
Category of Comorbid Conditions	72
Comorbidity by Gender and Race	73
Comorbidity by SES and Rurality	74
Comorbidity and Service Utilization	74
Comorbidity and Health Care Costs	75
Discussion and Conclusion	77
Implications for Policy.....	78
 Chapter 7: Dementia, Comorbid Conditions, and Health Cost	79
Introduction	79
Prevalence of Dementia	80
Diagnosis of Dementia and Physicians' Specialty	81
Volume of Service Utilization.....	82
Healthcare Cost by Dementia.....	82

Type and Cost of Dementia Comorbidity	83
Discussion and Conclusion	84
Chapter 8: Rural-Urban Residence and Service Utilization	87
Introduction	87
Urban and Rural Counties in Tennessee	88
Prevalence of Psychiatric Disorders by Rural-Urban Areas	88
Service Utilization by Rural-Urban Areas	89
Health Care Costs by Rural-Urban Areas	90
Healthcare Cost for Specific Diagnosis	91
Summary and Discussion	92
Chapter 9: Costs of Services among Medicare Elderly	95
Introduction	95
Race and Health Care Cost	95
Cost Functions	99
Results of Regression Analyses	101
Summary and Discussion	104
Chapter 10: Cost-Offset: An Exploration of Cost Containment	143
Introduction	143
Mental Health Cost-Offset	143
Exploring Cost-Offset in Medicare Data	144
Medicare Elderly Data	145
Statistical Analyses	145
Cost-Offset For Hypertension, Diabetes, and Cancer	145
Summary and Conclusions	147
References	149
List of Figures	
Figure 2-1: Sample population by years in study	28
Figure 2-2: Age by ethnicity and gender 1991-1993	29
Figure 2-3: Percent of the population in urban areas by race 1991-1993	31
Figure 2-4: Income by race, 1991-1993	32
Figure 2-5: Education by race 1991-1993	33
Figure 5-1: Physician visits by SES quartiles by race, 1991-1993	65
Figure 5-2: Hospital discharges per 1,000 person years by SES and race, 1991-1993	66

Figure 6-1: Gender and ethnic comparisons by multiple mental diagnoses, 1991-93	73
Figure 6-2: SES and rural/urban comparisons by multiple mental diagnoses, 1991-1993	74
Figure 6-3: Volume of services used by comorbid, 1991 - 1993	75
Figure 6-4: Average health care cost by five categories for comorbidity, 1991-1993	77
Figure 8-1: Percentage of medicare elderly with specific psychiatric diagnosis: rural-urban comparisons, 1991-1993	89
Figure 8-2: Service utilization among those with a mental diagnosis: rural-urban comparisons, 1991-1993	90
Figure 8-3: Healthcare costs among rural-urban elderly with a mental diagnosis, 1991-1993	91

List of Tables

Table 2-1: Number of Billing Records by Type and Year.....	28
Table 3-1: Rates per 1000 for major diagnostic categories by race, 1991-93	36
Table 3-2: Specific mental health diagnostic rates per 1000 by race, 1991-1993	38
Table 3-3: Service utilization among psychiatric diagnosed persons by race, 1991-1993.....	40
Table 3-4: Mean healthcare costs among psychiatric diagnosed persons by race, 1991-1993	41
Table 3-5: Rates of visits to specialty among psychiatric diagnosed persons per 1000 by race, 1991-93.....	41
Table 4-1: Percent of elderly with chronic conditions by gender, 1991-93.....	43
Table 4-2: Percent of services used by gender, 1991-1993	44
Table 4-3: Volume of services used by gender, 1991-1993	45
Table 4-4: Mean service costs by gender, 1991-1993	45
Table 4-5: Healthcare cost of beneficiaries with chronic medical conditions by gender, 1991-1993	46
Table 4-6: Rates of specific mental disorder per 1,000 diagnosed cases by gender, 1991-1993	47
Table 4-7: Healthcare cost of specific mental disorders by gender, 1991-1993	48
Table 4-8: Prevalence of psychiatric disorders by age category among white and African American beneficiaries, 1991 - 1993	50-51
Table 4-9: Percent of Services related to mental conditions used by age category, 1991-1993	52
Table 4-10: Volume of services used by age category among those with mental diagnoses, 1991-1993.....	53

Table 4-11: Healthcare costs by services in age category, 1991 - 1993	53-54
Table 5-1: Prevalence of psychiatric disorders by SES quartiles per 1,000, 1991-1993	60
Table 5-2: Prevalence of psychiatric disorders by SES quartiles for whites per 1,000, 1991-1993	61
Table 5-3: Prevalence of psychiatric disorders by ses quartiles for African Americans per 1,000, 1991-1993	62
Table 5-4: Age, gender, per capita income, education and residence within or outside a SMSA among medicare beneficiaries, 1991-1993	63-64
Table 5-5: Mean number of inpatient days by SES quartiles by race per 1,000, 1991-1993	67
Table 5-6: Mean health care costs by SES quartiles for whites per 1,000, 1991-1993	67
Table 5-7: Mean health care costs by SES quartiles for African Americans per 1,000, 1991-1993	68
Table 6-1: Average health care cost by service category and comorbidity, 1991-1993	76
Table 7-1: Prevalence of dementia among the medicare elderly with a mental disorder, 1991-1993	81
Table 7-2: Diagnosis of dementia by physicians' specialty, 1991-1993	81
Table 7-3: Average volume of services used by medicare elderly with mental disorders, 1991-1993	82
Table 7-4: Health care costs of medicare elderly with mental disorders, 1991-1993	83
Table 7-5: Health care cost by dementia categories, 1991-1993	84
Table 8-1: Average total healthcare costs for specific diagnosis among mentally ill in rural and urban communities, 1991-1993	92
Table 9-1a: Total health charges by year, 1991-1993	86
Table 9-1b: Health charges by year & race, 1991-1993	86
Table 9-1c: Total health payments by year, 1991-1993	87
Table 9-1d: Health payments by year & race, 1991-1993	88
Table 9-2: Prevalence rate of select physical and mental health problems, and rate of specialist utilization by year, 1991-1993	105-106
Table 9-3a: Total health charges by year, 1991-1993	107-108
Table 9-3b: Total health payments by year, 1991-1993	109-110
Table 9-4a: Skilled nursing charges by year, 1991-1993	111-112
Table 9-4b: Skilled nursing payments by year, 1991-1993	113-114
Table 9-5a: Home health charges by year, 1991-1993	115-116
Table 9-5b: Home health payments by year, 1991-1993	117-118
Table 9-6a: Hospice charges by year, 1991-1993	119-120

Table 9-6b: Hospice payments by year, 1991-1993	121-122
Table 9-7a: Physician charges by year, 1991-1993	123-124
Table 9-7b: Physician payments by year, 1991-1993	125-126
Table 9-8a: Inpatient charges by year, 1991-1993	127-128
Table 9-8b: Inpatient payments by year, 1991-1993	129-130
Table 9-9a: Outpatient charges by year, 1991-1993	131-132
Table 9-9b: Outpatient payments by year, 1991-1993	133-134
Table 9-10a: Inpatient mental charges by year, 1991-1993	135-136
Table 9-10b: Inpatient mental payments by year, 1991-1993	137-138
Table 9-11a: Outpatient mental charges by year, 1991-1993	139-140
Table 9-11b: Outpatient mental payments by year, 1991-1993	141-142
Table 10-1: Mean cost of diagnosis by depressive disorder, Tennessee medicare beneficiaries, 1991-1993	146

Abstract

In order to describe patterns of mental health utilization among Medicare beneficiaries in Tennessee, we analyzed data from a five- percent random sample supplied by the United States Health Care Financing Administration for the years 1991-1993. Primary areas of interest were race, socio-economic status (defined by income and education), mental comorbidity (defined as more than one mental health diagnosis during the same year), and mental/physical comorbidity. Analyses were restricted to the 33,680 beneficiaries who were 65 and older and who used medical services. Of these, most were female (60.8% or 20,477), and white (89.3%, or 30,081). African American females were the oldest beneficiaries (mean age 76.3 years), followed by white females (75.5), African American males (75.2), and white males (73.2). The median education in zip codes of residence for both whites and African Americans was 12th grade. Whites lived in zip codes with significantly higher median incomes than African Americans (\$13,092 vs. \$6,978).

The overall prevalence of psychiatric disorder was 15.9% and the average health care cost of these beneficiaries was almost twice the cost of services for those without psychiatric problems (\$12,659 vs. \$6,651). Further, the prevalence of mental illness was similar for African Americans (15.1%) and whites (15.9%). In contrast, African Americans were more likely to be diagnosed with dementia (50.0 versus 39.4 per 1,000 population), organic psychosis (39.7 versus 27.9), and schizophrenia (37.2 versus 31.1) while whites were more likely to be diagnosed as depressed (40.4 versus 22.2) or having an anxiety disorder (59.0 versus 35.6). African Americans had higher overall average yearly treatment costs (\$14,680 versus \$12,430), and this pattern was present in all sub-categories analyzed, including mental health, physical health, skilled and home health, and inpatient care. In multi-factorial analysis, however, educational level was the most consistent socio-economic predictor of utilization.

In these data, about 25% of beneficiaries with psychiatric problems had mental comorbidity. Those with mental comorbidity were more expensive to treat than those with a single diagnosis (\$15,872 per person per year versus \$11,579). Those with mental comorbidity also consumed a greater volume of services (27.6 versus 21.3 physician visits per year; 3.2 versus 2.8 out-patient visits; and 9.5 versus 5.7 in-patient days). The costs of treating patients with mental comorbidity were higher for both mental (\$2,356 versus \$350) and physical (\$9,663, versus \$6,745) health care. Beneficiaries with mental/physical comorbidity were also more costly. In particular, beneficiaries with depression plus hypertension or diabetes tended to use more services than patients with only hypertension or diabetes alone. Cost-equalization for these two groups alone was estimated to be \$14,000,000 per year state-wide. The results are consistent with the interpretation that elimination of racial and ethnic disparities may depend, in part, on reducing differential patterns of diagnosis (hence treatment) by providers, reducing differential patterns of utilization by beneficiaries, and restructuring

of services that provide both medical and mental health services at one site to effect cost containment. Other implications of these findings are discussed.

Executive Summary

With few exceptions (e.g., Rosenheck & Stolar, 1998), recent studies of mental health service utilization among older persons have not delineated specific patterns of service utilization among the African American elderly (e.g., Ford, Snowden, & Walser, 1991; Black, Rabins, German, McGuire, & Roca, 1997; Ganguli, Mulsant, Richards, Stoehr, & Mendelsohn, 1997). Therefore, it is not clear whether African American and white elderly differ in use of these services. A recent analysis reported by HCFA (see Summary Report to Congress, 1995; see Gornick et al., 1996) suggested that African American Medicare beneficiaries may underutilize medical services and that those in the lowest income category may utilize both ambulatory and acute services the least. Both race and low socio-economic status (SES) were the strongest predictors of lower use of certain services paid for by Medicare. However, this Medicare report used only income as an index of SES, and it is not clear whether similar results will emerge when both income and education are used in measuring SES of the beneficiary.

The present report presents results from a two-year study to examine the effects of race, socio-economic status, and comorbidity on the use of mental health services by elderly Medicare beneficiaries in Tennessee. The original intent was to focus on the five-year period from 1989-93, but limitations in the Medicare Program billing data limited analysis to years 1991, 1992, and 1993. In contrast to the HCFA (1995) and Gornick et al., 1996 analyses, which used only income as a measure of SES, this analysis included both income and educational attainment as indices of SES for Medicare beneficiaries. In addition to the effects of race, SES, and comorbidity, the findings of this study also provide insights into the effect of gender, age, and rural-urban residence on patterns of service utilization and treatment costs.

Data Source

The United States Health Care Finance Administration (HCFA) supplied data tapes for a five-percent random sample of Medicare beneficiaries from Tennessee who had received services between 1991 and 1993. The data included the standard analytical multiple linked output files of services provided by physicians, in-patient facilities, outpatient facilities, home health care facilities, hospices, and skilled nurses. These files also contained basic demographic information (gender, age, race, zip code, county of residence), medical and psychiatric ICD-9 diagnoses, physician specialty, number of visits (both inpatient and outpatient), approved treatment costs, and reimbursements.

The present observations include data from reimbursement records of 33,680 Tennessee Medicare beneficiaries who were 65 and older between 1991-1993. Individuals who did not use medical services in any year were not included in the sample. The majority of the sample is composed of females, 60.8% (n=20,477), with males making up 39.2% (n=13,203). The majority are Whites (89.3%; n=30,081), with African Americans making up 10.7% (n=3,599). In this sample, females are older than males (75.6 vs. 74.0 years respectively), and African Americans are older than whites by a year (75.9 vs. 74.9 years respectively). African American

females are the oldest of the beneficiaries (76.3 years), followed by white females (75.5 years), African American males (75.2 years) and white males (73.2 years). The median education of both whites and African Americans is 12th grade. Whites live in zip codes with considerably higher incomes than African Americans (\$13,092 vs. \$6,978 respectively).

We present findings relative to the prevalence of five psychiatric disorders (dementia, organic psychosis, schizophrenia, mood disorders and anxiety), rates of service utilization for all health problems, and overall health care costs among those with psychiatric disorders.

Findings:

Prevalence of Psychiatric Disorders: In these data 5,339 of 33,680 Medicare beneficiaries, that is, 15.9% (or 159 per 1,000) were diagnosed with psychiatric disorders according to ICD-9 codes. This prevalence rate of psychiatric disorders is similar to those reported by others (Robin & Regier, 1990; Regier et al., 1993 Kessler et al., 1994, 1996; Husaini et al., 1994; 1997). The rates per 1,000 for specific diagnoses ranged from 29.1 for organic psychosis, 31.8 for schizophrenia, 38.7 for depression, 40.6 for dementia, and 56.5 for anxiety and phobia disorders. Further analyses indicated that those with psychiatric diagnoses (n=5,339) tended to be older by 3 years than those without such problems (77.3 vs. 74.5 years respectively). Those with mental diagnosis as compared to those without mental problems had higher rates of service utilization (inpatient days, 6.7 vs. 2.8 days; visit to physicians, 22.9 vs. 13.6 visits; and visit to outpatient clinics, 2.9 vs. 1.7 visits respectively). Overall health care costs were also consistently higher (\$12,659 vs. \$6,651). In addition, inpatient costs (\$7,479 vs. \$3,848), physicians' cost (\$1,924 vs. \$1,160), outpatient costs (\$1,132 vs. \$733), and other costs such as skilled nursing and home health care (\$2,124 vs. \$909) were also significantly higher for those diagnosed with a mental disorder.

We also examined separately the cost of treating a specific category of psychiatric disorders. Our analyses show that organic psychosis had the highest treatment cost (\$17,462), followed by the cost for treating schizophrenia (\$15,509), dementia (\$14,445), depression (\$13,790), and anxiety-phobias (\$11,088). The higher expenditures for these diagnostic categories were largely due to hospitalization costs (\$10,797 as inpatient cost for organic psychosis; \$9,082 for schizophrenia; \$8,448 for dementia; \$8,358 for depression; and \$6,390 for anxiety). These analyses clearly indicate that beneficiaries with mental diagnoses were older and sicker, and have used disproportionately high levels of services.

The present discussion focuses on the relative effects of demographic and medical factors on diagnoses and service utilization among Medicare population of Tennessee during 1991-1993. The rates of mental diagnoses are presented per 1,000 with service utilization and treatment costs presented for those beneficiaries with at least one psychiatric disorder as a primary diagnosis (n=5,339). The effect of factors such as race, gender, age, social class, rural-urban residence, and multiple psychiatric diagnoses on psychiatric disorders and service utilization is summarized below.

Factors Related to Diagnosis and Service Utilization

Race: Studies of the physical health status of the general population have shown that race is a strong predictor of morbidity for various diseases including hypertension, stroke, renal disorder, diabetes, cancer, cardiovascular diseases and AIDS. Morbidity rates for these diseases have been consistently higher among African Americans than whites (Barnett, Armstrong, & Casper, 1997). However, in mental health studies, racial effects have not been as consistent (Howard, Cornille, Lyons, Vessey, et. al., 1996).

The findings of this study show no significant differences between African Americans and whites in the overall rates of mental illness. Specifically, mental diagnoses were observed among 15.9% of whites and 15.1% of African Americans over the three-year period. The present rates are similar to those reported by Chacko (1989) for other areas in the United States and by Husaini and his colleagues (1988a; 1988b; 1990; 1994; 1997) for Tennessee. In contrast, when the prevalence of specific diagnoses per 1,000 were examined, distinct racial differences emerged. For instance, African Americans (as compared to whites) had a significantly higher prevalence (per 1,000) of dementia (50.0 vs. 39.4), organic psychosis (39.7 vs. 27.9), and schizophrenia (37.2 vs. 31.1). On the other hand, depression (40.4 vs. 22.2) and anxiety disorders (59.0 vs. 35.6) were more prevalent among whites.

Among those with mental diagnoses, there were also racial differences in inpatient service utilization and costs. African Americans had higher utilization of emergency room services than whites (65.3% vs. 56.4% respectively), more home health and skilled nursing services (41.5% of African Americans vs. 34.2% of whites), and more inpatient services (8.9 days vs. 6.4 days respectively). Finally, African Americans (relative to whites) had higher treatment costs for mental health (\$1,123 vs. \$824), physical health (\$13,556 vs. \$11,605), skilled and home health care (\$2,493 vs. \$2,082 respectively), inpatient care (\$8,977 vs. \$7,309), and overall health care costs (\$14,680 vs. \$12,430).

The higher health care costs among African Americans with mental health diagnoses may result from a number of factors including delayed service utilization or inaccessibility to services. Services may be obtained only when medical conditions become severe and more expensive to treat. For example, previous studies indicate that African Americans use emergency room services at higher rates than whites (McCaig, 1994a, 1994b; Craig, 1994; Bazargan et al., 1995; 1998). When hospitalized, African Americans show more severe symptoms of illness (Buckle et al., 1992), and have longer hospital stays (Johnson et al., 1990). These factors may also contribute to the higher health care costs for African American Medicare beneficiaries as found in this study.

Gender: Our analyses show that females exceeded males in overall percentage (17.5% vs. 12.9%), and also had a higher prevalence (per 1,000) of dementia (46.1 vs. 30.1), organic psychosis (30.3 vs. 25.6), mood disorder (46.7 vs. 26.1), and anxiety/phobia disorders (67.3 vs. 37.6). Interestingly, the prevalence of schizophrenia was similar for males and females (30.0 vs. 33.0 respectively).

There were important gender differences in service utilization. Males were more likely than females to be hospitalized (44.8% vs. 41.4%) and to use emergency room services (60.2% vs. 56.0% respectively). Also, males had longer hospital stays than females (7.5 days vs. 6.3 days respectively) while females had a higher number of outpatient visits (3.1 vs. 2.6 respectively). Females were more likely to use home health and skilled nursing services than males (14.7% vs. 12.7% respectively). The increased use of emergency services and hospitalization by men resulted in men having significantly higher overall health care costs (\$13,973 vs. \$12,039 respectively).

Additional cost analyses revealed that men had significantly higher treatment costs than women per psychiatric disorder with the exception of schizophrenia: organic psychosis (\$18,988 vs. \$16,634), dementia (\$16,661 vs. \$13,518), depression (\$15,447 vs. \$13,325), and anxiety (\$11,975 vs. \$10,770). Only for schizophrenia, did the total cost for male beneficiaries come within \$200 of the total cost for females (\$15,613 vs. \$15,447). It is interesting to note that this is the only mental diagnosis for which men and women had similar prevalence rate (30 vs. 33 respectively per 1,000).

Interestingly, even though men used physician and outpatient services less often than females, their costs were still higher in these areas. This supports the view that men avoid using medical services until their problems become severe. Thus the higher treatment costs for men are consistent with the interpretation that men fail to seek treatment as early as women for both physical and mental disorders. This delayed treatment results in more severe conditions that contribute to increased use of expensive health services (i.e., inpatient and emergency services) among men.

Age: Our analyses clearly indicate that the prevalence of any psychiatric disorder and specific psychiatric disorders were age-related. For instance, the 65 to 70 year olds (young-olds in comparison to very-old (81+) were more likely to suffer from depression (32% vs. 14%) and anxiety (46% vs. 23%). In contrast, the very old (81+ years) were more likely to manifest symptoms of dementia (44% vs. 7% respectively), organic psychosis (27% vs. 8%), and schizophrenia (26% vs. 13%). Our observations support previous research indicating that dementia and Alzheimer's disease are more prevalent among the oldest old.

The analyses also indicate that, compared to their younger peers, the oldest-old (81+ years) had significantly higher service utilization with regard to hospital stay (7.3 days vs. 5.5 days) and visits to physicians (22.9 vs. 21.5) over the three year period. Also, the oldest-olds had higher inpatient costs (\$7,271 vs. \$6,838) and home health/skilled nursing costs (\$2,681 vs. \$1,305). Finally, the overall physical health cost was higher among the oldest-olds (\$12,047 vs. \$10,413). However, there were no significant differences between the two groups regarding mental health costs (\$779 vs. \$846).

There were no racial differences in the prevalence of specific diagnoses with regard to age categories; that is, the proportion of elderly within each age category did not differ significantly

by race. However, there were significant differences in health care costs by race within each age category. In all age categories, costs were higher for African Americans.

Social Class: During the last six decades, numerous studies have focused on the relationship between social class and mental illness. Generally, the studies have reported higher rates of psychopathology in lower socio-economic status (SES) or more severe diagnoses associated with lower classes (Faris & Dunham, 1939; Lemkau, Tietze, & Cooper, 1942; Hollingshead and Redlich, 1958). Neugebauer, Dohrenwend and Dohrenwend (1980) found that 17 of 20 studies showed higher rates of psychopathology in lower SES with an average ratio of 2.59 between the lowest and highest classes. Recently, Holzer et al., (1986, 1995) reported an inverse social class-psychopathology relationship in the data from the NIMH's Epidemiologic Catchment Area (ECA) studies. They found higher rates of cognitive impairment, schizophrenia, alcohol abuse or dependence, and depression in lowest SES than higher SES (Holzer et al., 1986; 1995).

In the present study, the overall prevalence (per 1,000) of mental diagnosis was somewhat higher among the elderly from lower social classes (SES) than those from higher social classes (156.5 vs. 154.5 respectively) but this difference was not statistically significant. Unlike previous studies, dementia, organic psychosis, and schizophrenia were unrelated to social class. However, whites with lower SES had higher rates of anxiety (65.4 vs. 51.0 per 1,000). Among African Americans, inverse relationships existed between SES and both mood and anxiety disorders.

Our analyses show that levels of SES (an index based upon both education and income levels) predicted different measures of service utilization as indicated by physician visits and hospital discharges. For example, higher SES predicted higher rates of physician visits (24.0 vs. 22.9 visits, $p < .05$). However, beneficiaries with lower SES had higher use of both outpatient visits (3.5 vs. 2.5 visits) and emergency services (62.1% vs. 54.0%, $p < .05$). The lower SES had slightly longer length of hospital stay (7.1 vs. 6.9 days).

Despite lower usage of physicians, there was no significant difference in the cost of physician services for low SES and high SES beneficiaries (\$2,010 vs. \$2,012 respectively). Similarly, there was no statistically significant difference in the cost of inpatient services for lower and upper SES patients (\$7,616 vs. \$7,898 respectively.) On the other hand, outpatient costs were higher for lower SES beneficiaries (\$1,257 vs. \$1,058, $p < .05$) as were costs for skilled nursing and home health services (\$2,931 vs. \$1,693 respectively, $p < .05$). Finally, both the mental health cost (\$673 vs. \$1,093) and the total cost were significantly higher for beneficiaries with low SES relative to peers from higher SES (\$13,815 vs. \$12,662).

These findings can support at least two divergent interpretations: (i) that persons with lower levels of SES (education) underutilize medical care (in this case, physician visits), resulting in more severe illnesses which, in turn, increases the need for hospitalization; and (ii) lower levels of SES (i.e., low education and income) may be the result of severe mental illness. In the later scenario, increased use of medical care by persons of low SES could simply be a reflection of the severity of their illnesses rather than their social class.

In summary, these data suggest that among these socio-demographic factors, age, income, and educational level are the most consistent predictors of utilization. The pattern of educational association was consistent with the interpretation that these factors may also reflect, in part, the patient's medical condition.

Rural-Urban Differences: Previous studies have generally reported higher psychopathology in rural communities. In this study of Medicare elderly, while the overall prevalence of any disorder was similar between rural and urban elderly (160.4 vs. 157.4 per thousand), there were significant differences with regard to specific diagnoses. Rural patients had significantly higher rates of anxiety and phobia disorders (63.6 vs. 52.3 per thousand, $p < .05$) while urban patients had a significantly higher prevalence of schizophrenia (33.4 vs. 29.0, $p < .05$). Similarly, urban patients had higher rates of dementia (41.5 vs. 39.0), and mood (depression) disorders (40.0 vs. 36.3). This higher rate of depression among urban Medicare patients is consistent with other studies which have reported higher depression rates among urban residents (Crowell et al., 1986; Mueller, 1981; Blazer et al., 1985, 1994).

Patterns of service utilization reflected availability and accessibility to service by location. For instance, urban beneficiaries were more frequently hospitalized and had longer stay as compared to rural patients (7.0 vs. 6.0 days). In contrast, rural patients utilized home health care (37.5% and 33.5%) and outpatient visits more than urban patients (3.5 vs. 2.6 visits respectively).

Total health care costs were similar for rural and urban areas in these data. However, urban elderly had significantly higher inpatient costs (\$8,018 vs. \$6,580) and mental health costs (\$981 vs. \$643) than their rural peers. In contrast, rural patients had significantly higher costs for outpatient (\$1,232 vs. \$1,071) and home health plus skilled nursing services (\$2,495 vs. \$1,902). Regardless of whether patients lived in rural or urban communities, treatment costs were highest for the treatment of organic psychosis (\$16,058 vs. \$18,335), followed by schizophrenia (\$15,146 vs. \$15,694), and anxiety/phobias (\$10,203 vs. \$11,723).

Previous studies have reported that 10% of the total health care cost is attributable to behavioral disorders (e.g., Borenstein, 1996). Our finding that mental health treatment costs compose 5.3% (in rural areas) to 7.6% (in urban areas) of total health care costs is somewhat lower (especially for rural areas) than what Borenstein has reported. The lower rural mental health cost among the Medicare elderly may indicate inadequate mental health specialty care available in rural communities.

Mental Comorbidity: Previous research has indicated that individuals with mental comorbidity (two or more mental diagnosis during the same year) use more services than persons with a single diagnosis. More than twenty five studies have focused on the issues of comorbidity as cited by Riegler et al. (1990), Bourden et al. (1992), and Kessler et al. (1998), but none has focused on the impact of comorbidity in the Medicare elderly populations.

As compared to those with a single diagnosis, comorbid patients were more likely to use both mental and physical health services and consume a greater volume of services (e.g., physician visits 27.6 vs. 21.3; outpatient visits 3.2 vs. 2.8; and inpatients days 9.5 vs. 5.7 days respectively). They also were significantly more likely to use emergency care (68.3% vs. 53.2%). Further, those with comorbidity were significantly and consistently more expensive to treat overall as compared to those with a single diagnosis (\$15,872 vs. \$11,579, $p < .05$). The costs of treating comorbid individuals were high for mental (\$2,356 vs. \$350), physical health care (\$13,516 vs. \$11,229), and hospital care (\$9,664 vs. \$6,745). These data suggest that a focus on beneficiaries with comorbidity may provide a fertile area for future research on cost reduction.

Dementia and Comorbid Conditions: We found 25% of those receiving a psychiatric diagnosis in our study had received the diagnosis of dementia, this percentage is similar to dementia prevalence (20%) reported for another study of Medicare elderly (Newcomer et al., 1999). In our data, only 30% of patients with dementia were seen by psychiatrists and none by a neurologist. It is tempting to speculate that the higher rate of dementia found in this Medicare population may reflect the absence of neurologic expertise. However, it is difficult to delineate the diagnostic criteria used by physicians from the reimbursement files. This lack of consistent diagnostic criteria applied across physicians adds simply to misclassification of patients and to higher frequency of dementia and higher healthcare costs as found in this Medicare study. It may also be appears that the dementia diagnosis is cost driven. During 1991-93, HCFA treated dementia as a medical condition (and not a psychiatric condition) paying 80% of the dementia related cost while it paid only 50% of the cost for other psychiatric diagnoses. Hence, this higher payment schedule for dementia may have encouraged misclassification as dementia with consequent cost-inflation. Further, since the dementia patients were older than non-dementia patients, it is also possible that their higher health costs reflect both their demented condition and age related poor health and complexity of medical problems. This may have led dementia patients to need more inpatient, home health care, and mental health services.

Finally, in our study, while dementia with depression was the least prevalent comorbid condition (only 7.4%), it emerged as the most expensive comorbid condition to treat. A possible explanation for the high cost is that depression may exacerbate the complications of dementia among the elderly. This finding has policy implications in that physicians may need to treat depression aggressively if other conditions are to be managed effectively. Further research is warranted in this area.

Costs of services: Mental illness imposes huge expenditures on society. These expenses include the direct costs of treatment – hospitalization, physician services, drug therapy, counseling, and productivity losses resulting from lower employment and reductions in hours of work. Recent estimates by Rice and colleagues (1991; 1995; 1996), Dupont and Rice (1996), and Kessler and Frank (1997) have suggested that mental illness cost the United States economy is substantial, close to \$67 billion in treatment expenditures and \$75 billion in productivity losses.

We measured differences in the costs of Medicare services for African American and white patients. Analysis of mean differences in charges and payments for health services suggested that African American patients were more expensive than white patients and these differences increased in the time between 1991 and 1993. We found that African American patients were more likely to use high-fee specialists than white patients and were more likely to report costly health problems such as stroke, metabolic disease, circulatory disease, alcohol dependence, schizophrenia, and organic brain disease. When we controlled for health diagnoses and for physician choice, racial differences in charges and payments persisted. In 1993, African American patients cost Medicare \$1,295 more than white patients. Why this racial difference has persisted is as yet unknown. From Medicare records, we could not control for important individual differences in wealth, education, family background or accessibility to services, which are likely important explanators of the use of health services. In addition, beneficiaries who did not use medical services in a year were not included in the data base. Future research should focus on these individual differences as the likely causes of the racial disparity in the health care costs of the elderly.

Cost-offset and Cost-Containment: Finally, we explored the Medicare data for cost-offset for the three chronic conditions that substantially contribute to higher healthcare costs. According to the cost-offset hypothesis, the expenses involved in providing mental health services are balanced by subsequent reduction in the costs of treating physical health problems (Zhang et al., 1999).

We examined the cost-offset hypothesis for beneficiaries with hypertension, diabetes mellitus, and cancer. For each illness, beneficiaries were further dichotomized as to the presence or absence of depression. The analyses show that hypertensives with depression had significantly higher charges than those with hypertension alone (\$10,304 vs. \$6,777, a difference of \$3,527 per patient). Similarly, the treatment cost for diabetes with depression was higher than the treatment cost for diabetes alone (\$14,096 vs. \$9,969, a difference of \$4,127 per patient). The lowest cost difference existed for cancer patients with depression and patients with cancer alone (\$12,384 vs. \$10,152, a difference of \$2,232 per patient).

Given these data, we hypothesize that if future cost containment studies were specifically linked with chronic problems which require patients' adherence to both life style and treatment regimes, the potential for benefits would be greater than for the patient whose treatment did not include adherence to self-medication and changes in life style. Hypertension and diabetes mellitus may be good examples of the former, while cancer may be an example of the latter.

The data suggest that focused management of these Medicare beneficiaries with both depression and a chronic medical condition (non-mental illness) could lead to decreased non-mental health care expenses. In these data, for example, cost-equalization for hypertensive patients with and without depression, would lead to savings in excess of \$14,000,000 per year for 4,140 beneficiaries who were both hypertensive and depressed. Given that there were 12,114 hypertensive patients in these data with no known mental abnormalities (including depression), it is likely that the actual savings for cost-equalization could be even greater.

It may be noted that the suggested cost containment may be greater only when aimed at patients with non-mental health problems whose successful treatment requires patients' considerable self motivation with respect to adherence to taking medication and changing life style.

Interestingly enough, the present data show that treating mental illness along with a physical ailment, was relatively inexpensive, even among patients known to be depressed. Charges ran approximately \$80 per year for patients with hypertension and depression, \$47 per year for patients with diabetes mellitus and depression, and \$36 per year for patients with cancer and depression. Based on previous studies (e.g., Gottlieb, 1996), this lower cost may represent under treatment of mental problems.

Briefly, our analyses support the possibility of significant cost-offset for the treatment of depression. In order to realize this potential, however, the data suggest the development of a depression monitoring program. The aim of this program should be to overcome many of the barriers inherent in traditional primary care patients who are depressed or have chronic medical conditions.

Implications For Research

Two implications are obvious from our analyses:

1. Since the analyses are limited to Tennessee Medicare data from 1991-1993, it is imperative that the most current Tennessee Medicare data (e.g., 1994-1998) be examined to determine changes in trends noted for diagnoses, service utilization, and treatment cost since 1993.
2. It is difficult to determine how comparable the Tennessee data are relative to other regions of the nation; regional and national profiles are needed to overcome this limitation.

Implications For Policy And Program

1. The present data show that costs for beneficiaries with a mental comorbidity are greater than costs for beneficiaries without a mental illness. It is important to determine how much of this difference is due to failure to link mental and non-mental health care. For example, if a patient with a mental illness has to go to two different places for treatment rather than being able to obtain co-ordinated mental and non-mental health care at one physical location, the net result will be that the patient with a mental illness will have more gaps in care and hence more costly care. In sum, the policy of “carving out” mental health care may contribute to higher costs as well as to poor access to services, specially for African Americans.
2. The data suggest that patients with depression are not receiving much in the way of mental health care and therefore the potential of cost-offsets are not attained from the aggressive treatment of depression. However, the data also suggest that cost containment potential may vary depending on the type of comorbid medical condition which may require a greater amount of patient cooperation. For example, the depressed patient with hypertension has a higher potential for cost containment than the depressed patient with cancer. For the maximum benefit, attention will also have to be directed to the prevalence of non-mental illness.
3. These data suggest the potential importance of chronic disease management models, which account for mental and non-mental comorbidity. The potential may be particularly great if successful management of the non-mental illness is heavily dependent on patient adherence to treatment recommendations. Hypertension, for example, can be positively influenced through a program of medication and lifestyle modification. If a patient suffers from depression in addition to hypertension, the highly co-ordinated management of both mental and non-mental illnesses may be vital. On the other hand, highly co-ordinated management may be less vital if management of the non-mental illness requires a relatively small degree of patient decision-making.
4. Elimination of racial and ethnic disparities in health care will depend in part, on the elimination of differences in diagnosis and management, which are inappropriately based on race, gender, and /or social class. This will involve:
 - i. Training practitioners to recognize diagnostic and management tendencies that may be based upon perceptions related to patient’s age, race, education, gender, income, and social characteristics.

- ii. Closely monitoring the diagnostic and management patterns of health organizations to detect and eliminate differences in diagnosis and management decisions that are inappropriately tied to race, gender, and / or social class.
5. Finally, cost-effective care for illnesses of importance to racial and ethnic minorities may require the re-structuring of medical teams to assure the coordinated management of mental and non-mental illness. Rigorous testing of team oriented management approaches for patients with comorbid mental and physical illness should be undertaken to monitor cost containment and quality control over treatment modalities.
6. If the observations in these data are borne out in clinical intervention trials, policy implications might include regulations and/or allocations that facilitate co-ordination of mental and non-mental health care. These might include:
 - i. Co-locating clinical services so that patients do not have to make separate trips to receive mental and non-mental care;
 - ii. If co-location is not feasible, facilitation of co-management via telemedicine or other communication techniques will be needed; and
 - iii. Use of a co-ordinated team approach to disease management that emphasizes aggressive care for both mental and non-mental illnesses, attention to lifestyle modification and self-management, and recognition of the social as well as medical approaches to treatment. Positive impact of such a coordinated approach has been reported by Lebowitz and his colleagues (1987).

Limitations Of The Study

While our findings prove interesting and confirm some trends reported by previous studies, the present data have several limitations that must be noted:

1. Information on income (per capita income) and education (percent completed high school) are based upon the 1990 census data for the beneficiary's zip code associated with the area of residence. These data are not the beneficiary's data per se.
2. While there was a linkage with per capita income, the Medicare claims file includes information only about beneficiaries who are able to make Medicare Part B payments. As such, the poorest of the poor (those who are unable to purchase Part B coverage) are not represented in this data set. This may account, in part, for the failure to detect a consistent independent association with per capita income among these beneficiaries.
3. Medicare beneficiaries who did not receive services in a given year are not included in the analyses. This can result in an inflation of the service utilization and cost figures.

Preface

Since 1976 the Center for Health Research at Tennessee State University has conducted a series of health and mental health studies which examined both the rate of morbidity and service utilization by adults. These studies of both rural and urban communities were conducted in Tennessee, Ohio, and Oklahoma to determine correlates of and changes in morbidity and service utilization among young, middle aged, and aged adults. In 1990, the Center completed two large-scale surveys of elderly Nashvillians regarding their health and mental health status. This study is an extension of the previous studies since it focuses exclusively on the Medicare elderly population of Tennessee and examines the influence of race, social class, and mental comorbidity on service utilization.

The study is exclusively an examination of service reimbursement data provided by Health Care Financing Administration (HCFA) for a period of three years (1991, 1992, and 1993). The data sets had numerous problems including missing information relative to diagnoses procedures, and a breakdown of total reimbursed amounts. These errors largely resulted from attempts to modify reimbursement forms submitted by service providers. Despite these shortcomings, we were able to develop some coherent trends, which point to the role that race, social class, and comorbidity play in the service utilization of Medicare elderly. The effect of social class was least discernable since beneficiaries' education and income level were not available from the reimbursement files used in this project. Since the beneficiaries' zipcodes and county of residence were available, we were able to merge the available 1990 census data on education and income by zipcodes. This attributed data to beneficiaries came closest to determining the effect of social class (as an index of both income and education). We recognize the flaws of this methodology, however, given our limitations, we accepted this to be a prudent and expeditious method to examine the effect of social class. Besides that, this methodology has been successfully used by HCFA previously (Gornick et al., 1996).

This report is a product of the dedicated efforts of many people, who despite other commitments continued to make contributions toward successful completion of this project. This is a product of team effort, consisting of collaborators from three institutions, namely, Tennessee State University, Meharry Medical College, and Vanderbilt University. I am indebted to each team member who contributed toward drafting various chapters such as methodology (Van Cain), effect of race (Oscar Miller), effect of comorbidity (Tom Summerfelt), effect of social class (Robert Levine & Chuck Holzer), rural-urban residence and service utilization (Chuck Holzer), cost of treatment (Kathy Anderson), and managing cost (Robert Levine) and to the data management and analysis team (Van Cain, Oscar Miller, and Myron Burns). I am also grateful to J. R. Newbrough, Robert Levine, and Chuck Holzer for their insightful comments and suggestions for clarity of writing; and to Deborah Pitts and Roxanne McClain, student research assistants, whose eagle eyes caught the editorial omissions that slipped our attention.

We lastly acknowledge the assistance provided by Mike Haddad and his staff at HCFA for data and technical support to establish clarity of the data arrangement. Finally, we acknowledge the tireless support and commitment of Richard Bragg, Project Officer of Minority Program at HCFA in developing channels to translate into reality the Presidential Executive order to involve HBCUs in HCFA's research and development programs. The views and interpretations of data expressed in no way represent HCFA's views or policies regarding Medicare programs.

Baqar A. Husaini, Ph.D.
Principal Investigator

Chapter 1

Purpose of the Study

Introduction

Recent studies have examined the utilization of mental health services among older persons in outpatient and hospital settings (e.g., Ford, Snowden, & Walser, 1991; Black, Rabins, German, McGuire, and Roca, 1997; Ganguli, Mulsant, Richards, Stoehr, and Mendelsohn, 1997). With the exception of a Veterans Affairs report (Rosenheck and Stolar, 1998), most of these studies have not delineated specific patterns of service utilization for mental health problems for the general population of African American elderly. Further, it is not clear whether a variation in use of mental health services exists between white and African American elderly and whether this variation is affected by socio-economic status. A recent analysis of medical service data reported by HCFA (see Summary Report to Congress: Monitoring the Impact of Medicare, Physician Payment Reform on Utilization and Access, 1995) showed that African American Medicare beneficiaries underutilized medical services and that those in the lowest income category utilized both ambulatory and acute services the least. Both race and low socio-economic status (SES) were the strongest predictors of lower use of certain services paid for by Medicare. However, this Medicare report used only income as an index of SES, and it is not clear whether similar results will emerge when both income and education are used in measuring SES of the beneficiary.

The purpose of the present two-year study was to examine the effects of race, socio-economic status, and comorbidity on the use of mental health services by the elderly Medicare beneficiaries in Tennessee. The original intent was to focus on the five year period 1989-93, but limitations in the Medicare Program billing data restricted analysis to the years 1991, 1992, and 1993. In contrast to the aforementioned report of Medicare beneficiaries, this study includes both income and educational attainment to develop indices of SES for the beneficiaries.

Studies of the health status of the general population have indicated that race is strongly associated with premature mortality and illness rates (Barnett, Armstrong, and Casper, 1997). For instance, African Americans: (i) have twice the rate of stroke as white Americans; (ii) have kidney problems 10 to 18 times more frequently than whites; (iii) are three to five times more likely to have heart failure than whites; (iv) have more diabetes related problem (e.g., vision, foot ulcer, or loss of sensation in the feet) than whites; (v) have more cardiovascular and rheumatic heart diseases than whites; (vi) have higher rates of prostate, lung, cervix, and colon cancer than whites; and (vi) have higher HIV rates than whites. All of this evidence is consistent with an adverse experience relative to whites with respect to health. It is therefore reasonable to be concerned about healthcare access and utilization among African Americans.

1.1. Specific Aims

Age relevant program and policy considerations mandate systematic examination of Medicare data on mental health service utilization to clarify the role of social class, ethnicity, comorbidity, diagnosis, type of services, and mortality among the mentally ill. Within these broad parameters, our specific aims included the following:

- (i) To determine the effect of race on the prevalence of psychiatric disorders, service utilization, and healthcare costs;
- (ii) To determine the effect of socio-economic status (SES) (using both income and education as indicators of SES) on psychiatric disorders, service utilization, and healthcare cost; and
- (iii) To determine the effect of mental comorbidity on service utilization and cost of treatment;

Additionally, we examine the effect of gender and rural-urban residence on diagnoses, service utilization, and cost of services provided through Medicare.

1.2. Significance Of The Study

This study is significant for the following reasons:

- (i) It is the first systematic analysis of the effects of race, SES, and mental comorbidity on mental health service utilization; hence this study fills a void in the knowledge base regarding service utilization;
- (ii) The study uses education in addition to income as an indicator of socio-economic status (SES). It may be noted that the previously cited Medicare study (Gornick et al., 1996) used income only as an index of SES to examine the effect of race on medical service utilization by Medicare beneficiaries. Educational attainment may be particularly relevant to beneficiaries' openness to mental health services;
- (iii) the study points to the role that SES (income and educational factors) may play within each racial group with regard to use of mental health services. At the applied level, results of this project can help develop policies and programs aimed at removing barriers that can in turn increase appropriate and more cost effective service utilization, particularly among the African American elderly. The findings of this study are relevant in determining barriers that impede service utilization in the African American community.

2. Issues of Need, Mental Comorbidity, And Use of Mental Health Services: A Literature Review

2.1. Issue of Need For Services: Recent estimates of mental illness among American adults indicates that in any 1-year period, approximately 22% of the population suffered from a treatable mental disorder. Further, in any 6-month period, 19.5% of the U.S. adult population, or 1 in 5 persons over 18 years of age, suffers from a diagnosable mental illness (Robins, Helzer, Weissman, Orvaschel, Gruenberg, Burke, & Regier, 1984; Robins & Regier, 1990; Bourden, Rae, Locke, Narrow, & Regier, 1992; Regier et al., 1990; Holroyd and Duryee, 1997). This rate of psychiatric morbidity is far below rates of other medical disorders such as respiratory disorder (50%) or cardiovascular disorder (20%). Some of the mental disorders which affects 7% of adults may persist for a year or more. Further, approximately 3% of the adult population (approximately 5 million persons) suffer from **severe** mental disorders (which includes schizophrenia, bipolar disorder, major depression, panic disorder, and obsessive-compulsive disorder). Among the psychiatric disorders, depression represents one of the most common lifetime mental illness among adult Americans. In fact, during any 6-month period, 9 million American adults suffer from a depressive illness. The lifetime prevalence rate for depression is reported to be 10%, second only to the 13.3% lifetime prevalence rate for alcoholism. A recent survey of American adults shows that a major depressive episode was experienced by more than 17% of survey participants in their life time and that more than 10% had experienced depressive episodes in the previous twelve (12) months (Kessler, McGongole, Zhao, Nelson et al., 1994; Kessler et al., 1996).

Previous longitudinal studies have also established the persistence of depression over time. A longitudinal study in Kansas city reported that 30% of a sample found depressed at T_1 continued to be depressed at T_2 (Hornstra & Klassen, 1977). Similarly, in a study of change in depression over a 12-month period, Lin & Ensel (1984) reported that 7% of the sample fell into the chronic category (i.e., depressed both at T_1 and T_2) while 10% were the newly depressed (individuals not depressed at T_1 but depressed at T_2). Persistence of depression over time has also been found among rural and urban adults of Tennessee (Husaini and Linn, 1985). Among the rural adults, of those depressed at T_1 , 30% remained depressed at T_2 (the chronic group), and among those not depressed at T_1 , only 5% became depressed at T_2 (i.e., the newly depressed). In the urban sample, 31% were from the chronic group and 2% were the newly depressed. A similar pattern of chronicity in depression over time has also been reported by studies of patients which show that 50% of the sample found depressed at T_1 remained depressed a year later at T_2 (Hankin & Locke, 1982). In a study of the elderly in Cleveland, Haug, Belgrave, & Gratton (1984) have reported that over a period of 12 months ($T_1 - T_2$), 34% of the elderly showed decline in their mental health while about 40% showed improvement.

Further evidence of need for mental health services is provided by Husaini's early 1990's Nashville Elderly Projects (Husaini, 1997). The subjects ($N=1200$) were randomly selected from private dwellings and highrises for the elderly that were racially mixed and those which were exclusively occupied by either whites or African American

elderly. The median age of the sample was 70 years, and approximately three-fourths of the sample consisted of females with less than 10% of the subjects married. As compared with their peers who lived in their homes, the highrise residents (elderly) had more medical problems, higher mean depression score (10.3 vs. 7.5), and smaller support network sizes. According to their DSM-III diagnoses, 19.4% of the highrisers as compared to 14.8% of those living in their homes had a clinical psychiatric disorder. These figures were inflated by the diagnosis of simple phobias (15.5% among the highrisers versus 11.3% among the home dwellers). Major depression was less than 1% (.9% versus .2% in the two residential groups respectively).

2.2. Issue of Mental Comorbidity:

Our focus on mental comorbidity (defined as the occurrence of more than one disorder in the same person at the same time) is anchored to previous studies which have also reported co-occurrence of various types of medical disorders and psychiatric symptoms among individuals suffering from diagnosable psychiatric illness (Hall, 1983; Waxman, Carner, Blum, 1983). For instance, Bourden et al, (1992) reported that among 19.5% of adults who had experienced any psychiatric disorder in the last 6-months, 25% had also experienced additional disorders (e.g., alcohol and substance abuse) during the same time (mental comorbidity). These co-morbidities tended to utilize services more than those with only one diagnosis (Regier et al, 1990; Bourden et al., 1992; Moos and Mertens, 1996).

Similarly, individuals experiencing stress resulting from acute or chronic medical conditions are more likely to manifest other related physical and psychiatric symptoms including severe depression (Hankin, 1980; Husaini & Moore, 1990; Husaini, 1984a; Husaini, 1983a; Husaini, Linn, & Whitten-Stovall, 1988; Husaini, 1983a, 1983b, 1993, 1995a, 1995b; Husaini & Neff, 1980; Neff, Husaini, & McCorkel, 1980; Husaini & Bazargan, 1994; Husaini & Linn, 1984; Husaini & Von Frank, 1985; Neser et al., 1990; Aneschensel, Frerichs & Huba, 1984; Berkman, 1977, 1980, 1984; Berkman & Syme, 1979; Berkman & Breslow, 1983; Hankin & Oktay, 1979). Thus, it is possible to expect that such individuals are more likely to overutilize both medical and mental healthcare services.

In our previous Tennessee rural and urban studies, chronic medical problems, general health self-rating, and the number of physician visits were all related to depressive symptoms (Husaini & Neff, 1980; Neff, Husaini, & McCorkel, 1980; Husaini, Linn, & Whitten-Stovall, 1988; Linn & Husaini, 1985; Husaini, Bazargan, Broad, & Castor, 1995). In fact, problems of circulatory, digestive, genitourinary, and endocrine systems were associated with higher depression levels among the adult Tennesseans (Husaini, 1983b, 1993; Husaini, Moore, & Cain, 1994; Husaini & Moore, 1990; Linn, Husaini, & Whitten-Stovall, 1990; Linn & Husaini, 1990; Husaini & Linn, 1984). Similarly, a study of Kentucky elderly found that kidney or bladder problems, circulatory problems, lung difficulties, and strokes were all related to depression, and that one-third of the females and one-fourth of the elderly males with these medical problems were likely to be depressed (Murrell, Himmelfarb, & Wright, 1983). Finally, Haug, Belgrave & Gratton

(1984) found in their follow-up study of the elderly in Cleveland (Ohio) that good health at T2 and less illness during the prior year combined with social support emerged as strong predictors of improvement in mental health at T2. Clearly then, evidence suggests that many individuals are likely to experience comorbidity and that these co-morbid individuals use more medical and mental health services possibly to excess (Mumford, Schlesinger, Glass, Patrick, and Cuerdon, 1984).

2.3. Use Of Mental Health Services

While need for the mental health services is relatively high among the elderly, (9% to 20% are reported to suffer from psychiatric problems (see Chacko, 1989; Husaini, Castor, Linn, et al., 1988), seeking help from mental health professionals has remained very low (4% to 20% of the elderly have ever used a mental health source for help, see Redick, Kramer, & Taube, 1973; Dorken & Webb, 1973; Husaini, 1983b; George, Blazer, Winfield-Laird et al., 1988; Burns, Wagner, Taube, Magaziner, et al., 1993; Schappert, 1993; Olsson and Pincus, 1996). This is equally true of the Nashville elderly population where less than 6% (4% of African American and 6% of white elderly) sought help from a psychiatrist or a psychologist while one-third sought help from a family physician for mental health problems (Husaini, Moore, & Cain, 1994). African American elderly in rural Tennessee also reported a similar pattern of help seeking from their family physicians for emotional problems (Husaini, 1983b). Whether this pattern is associated with the accessibility of family physicians, or the non-availability or inaccessibility of mental health professionals, requires further investigation.

Available evidence suggests that there is a real gap between the need for services and the use of services by the elderly, and that this gap is greatest among the minority groups (Snowden, 1988; Neighbors, 1985; Neighbors, Bashshur, Price, Selig, Donabedian, & Shannon, 1992; Hough et al., 1987; Sussman, Robins, & Earls, 1987; Husaini, 1983b; Husaini, Moore, & Cain, 1994; Maynard, Ehreth, Cox, Peterson, and McGann, 1997). The reasons for this gap call for sustained systematic investigation. For example, while the NIMH's Ecological Catchment Area (ECA) data indicate that the mental health service utilization rate can be very low for a minority group (Hispanics in one case - see Hough, Landsverk, Karno, et al., 1987; for a study of African Americans, see Black, Rabins, German, McGuire, and Roca, 1997), such data do not deal with the specific patterns of service utilization by the African American elderly. It is suggested that differential use of services among the ethnic groups may be associated with the stigma of mental illness, acceptance of such problems occurring due to age, age discrimination, or with access barriers to services (Lebowitz, 1986; Lebowitz, Light, & Bailey, 1987; Light, Lebowitz, & Bailey, 1986; Padgett, Patrick, Burns, & Schlesinger, 1994). Additionally, a recent study of mental health services in a national insured population (Blue Cross-Blue Shield) showed that minority groups had a lower service utilization as compared to whites. It is possible that these lower rates of utilization among the minority groups may reflect attitudinal and/or services system barriers (Padgett Patrick, Burns, & Schlesinger, 1994; Snowden and Hu, 1997).

The level of needs and service utilization have also been reported by the recent Ecological Catchment Area (ECA) Projects conducted at five different sites (New Haven, Baltimore, Durham-Raleigh, Houston, and Los Angeles). It is estimated that while 15% of the adult population suffered from a diagnosable psychiatric illness, only 20% of these mentally ill sought help in the mental-health-care sector and 50% received help in general-medical-care setting. More than one-fifth of those needing help did not ever seek or receive help from any professional source (Regier, Goldberg, & Taube, 1978). In contrast, persons with mental disorders appear to use more medical-care services than those without such disorders (Goldberg & Blackwell, 1970; Hankin & Otkay, 1979; Mechanic, Cleary, & Greenley, 1982; Wells et al., 1982, 1988). However, it is not clear whether people with diagnosable mental disorders use medical services to avoid mental health stigma, whether they use medical services when their mental problems become severe, whether they use medical services for minor mental health problems, whether their use of mental health services reflects somatization of their medical problems or whether there is comorbidity with severe medical problems requiring psychiatric professional attention (Regier, Goldberg, Burns, et. al., 1982; Kessler, Tessler, Nye, 1983; Wells, Manning, Duan et al., 1982; Fortney, Rost, and Zhang, 1998; Hansson, Persson, and Borgquist, 1997). Whatever the explanation, it is evident from the ECA and other studies that there is disproportionate of general medical care by those needing mental healthcare (Simon and Katzelnick, 1997), and that only about one-fifth (20%) of those with a diagnosable psychiatric illness receive help only from mental health professionals.

In the last two decades, studies of mental health services have focused on ambulatory care with regard to office visits to psychiatrists and psychiatric diagnoses. The National Center For Health Statistics examined data regarding office visits to psychiatrists during 1975-76 and 1989-90 (Cypress, 1978; Schappert, 1993; also see NCHS, 1992). The data show that, during the two-year period of 1989-1990, an average of 18.8 million visits per year were made to psychiatrists (Schappert, 1993). The visits to psychiatrists were less frequent among the elderly (65 years and over) as compared to other age categories. The average visit rate per 100 persons was 4.6 among the elderly as compared to the rates of 12.8 and 11.4 for age categories of 45-64 years and 25-44 years, respectively. Further, among the elderly, females had higher visit rates than males (5.7 versus 2.9). A further analysis by race shows that 92.4% of the visits to psychiatrists were made by whites and only 5.6% of such visits were made by African Americans. This disproportion in visits points to a significantly higher visit rate (per 100 persons) by whites than African Americans (8.4 vs. 3.5). It may be noted that these visits by race are not broken down for those over 65 years old. Hence, the visit rate per 100 persons for the elderly African American and white elderly populations remains unknown.

Data on diagnoses as reported by Schappert (1993) show that the principal diagnoses for ambulatory mental health visits included depression (36.8%), anxiety disorders (13.4%), and personality disorders (10.2%). While statistically significant gender differences were not found for anxiety disorder, females visited psychiatrists more often than males for depression (41.5% vs. 30.1%), and males visited psychiatrists more

often for the personality disorders (13.6% vs. 7.8%). Among the elderly, 63% of all visits were associated with depression. Importantly, Schappert (1993) has also reported that only a small percentage of payment for these psychiatric services was reimbursed by Medicare (9%) and Medicaid (6.2%), suggesting a major barrier for persons of low SES.

In addition to variability by demographic factors, research on mental health services indicate that rates of service utilization are affected by a number of other influences such as: (i) natural helping networks composed of relatives and friends; (ii) structural factors related to availability, awareness, accessibility; and (iii) the cultural barriers which may stigmatize those who seek mental health services. Such cultural barriers are exemplified by communication difficulties between the service provider (e.g., typically middle class white therapists) and African American elderly patients with poor education (Neighbors et al., 1992). Barriers to healthcare, both subtle and overt, may be multiplied when age discrimination combines with ethnicity to disrupt the service provider-recipient relationship. If trust in the provider is built through informed healthcare, it may overcome social barriers and in turn may increase help-seeking behaviors among the African American elderly.

Studies also indicate that rates of utilization are lower among sub-groups of the elderly due to: (i) lack of commitment, competence, and poor training of professionals and physicians working with the elderly (see Radecki, Kane, Solomon et al., 1988); (ii) financial and transportation difficulties; (iii) negative attitudes among the elderly toward help seeking for emotional problems; and perhaps (iv) age discrimination (younger adults may be referred more often than the elderly for mental health services (see Greenfield, Blanco, Elashoff, & Ganz, 1987; Lasoki, 1986; Light, Lebowitz, & Bailey, 1986; Lebowitz, Light, & Bailey, 1987; Lebowitz, 1986). Thus, it may not be surprising that the elderly may become alienated from the healthcare system and deny seeking help from mental health professionals because they consider their problems as simply "going through a hard time" - which does not require any professional work. These factors help the elderly gravitate more toward family physicians and clergymen as sources of help for emotional problems. This is particularly true of African Americans where the church has played a pivotal role in meeting various socio-economic and emotional needs of the African American community.

Summary

While previous investigators have provided extensive data on factors which influence the utilization of mental healthcare, there are gaps related to the elderly, particularly as related to race and socio-economic status. In order to support programs and policy decisions affecting the African American elderly population, this study provides data pertaining to the mental health service utilization by the Medicare beneficiaries in Tennessee between 1991 and 1993. Within the prevalence of psychiatric disorders and differences by race and social class, the study focuses on the effect of race, gender, age, social class, rural-urban residence, and mental comorbidity on patterns of service utilization and treatment costs over a period of three years.

Chapter 2

Methodology

Description of Sample

The United States Health Care Finance Administration (HCFA) supplied data tapes on a five-percent random sample of Medicare beneficiaries from Tennessee who had received services between 1991 and 1993. This sample included the standard analytical multiple linked output files on services provided by physicians, in-patient facilities, out-patient facilities, home healthcare facilities, hospices, and skilled nurses. These files also contained basic demographic information (gender, age, race, zip code, county of residence), medical and psychiatric ICD-9 diagnoses, physician specialty, number of visits (both inpatient and outpatient) and treatment costs. The analytical files included reimbursements for physician services; out-patient services, in-patient services, home health services, skilled nursing services, and hospice care services.

For each of the three years, these multi-part billing records were linked together using the link number already provided with each type of record. The beneficiary's unique ID number using the link number already provided with each type of record. The was then used to link these various types of records together. Finally, we aggregated the data by social security number to provide individual level data for each year as the basis of any analysis. The physician's reimbursement files were used to develop the demographic data for each individual. This data included ethnicity, gender, birth date, age, county of residence and zip code of residence for each beneficiary. Finally, we further refined the sample to include data only for those Medicare beneficiaries that were over 65 years of age.

The physician data set was the largest with 669,154 billing records for 1991, 741,340 for 1992, and 753,714 for 1993. The hospice data set was the smallest with 179 billing records in 1991, 290 in 1992, and 434 in 1993 (see Table 2-1). Only the inpatient records showed a decrease from 1991 to 1993. By contrast, the number of billings from hospices more than doubled from 179 to 434 between 1991 and 1993. The number of billing records by type and year is shown in Table 2-1. These records cover the billings of 35,673 Medicare beneficiaries 65 years of age or older (see Figure 2-1). Of these beneficiaries, records for 28,853 individuals were available for analyses in 1991, 28,992 were available for 1992, and 29,791 for 1993. For a majority of the sample ($n = 22,661$), data for individual beneficiaries was available for all three years. Data covering 6,641 beneficiaries were available for two years, and data for 6,371 individuals was available for only one year (see Figure 2-1). The total sample for years 1991-1993 was computed by combining the 1991, 1992 and 1993 samples. Costs of treatment and number of visits to physicians were averaged by the total cost or number of visits divided by the number of years in the study. Diagnoses were computed by determining if the subject had received a diagnosis, ICD-9 code, within the three year period. The only exception to this procedure is in the computation of mental comorbidity. For an individual to be coded as comorbid, he/she must have been diagnosed with two different mental health diagnoses within the same calendar year. An individual

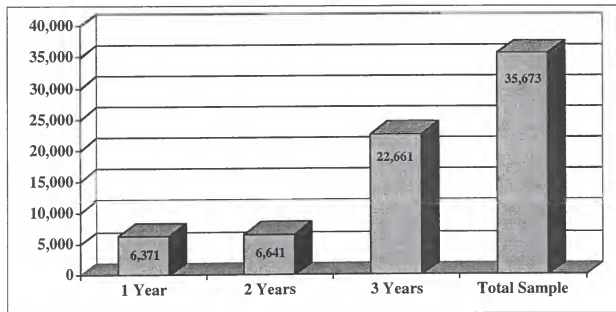
with more than one mental health diagnosis would not be classified as comorbid if these diagnoses did not occur during the same calendar year.

Table 2-1: Number of billing records by type and year

Types of services	1991	1992	1993
Physician	669,154	741,340	753,714
Outpatient	63,425	72,881	78,775
Inpatient	13,863	14,194	13,036
Home Health	22,486	25,584	29,586
Skilled Nursing	1,375	1,561	1,909
Hospice	179	290	434

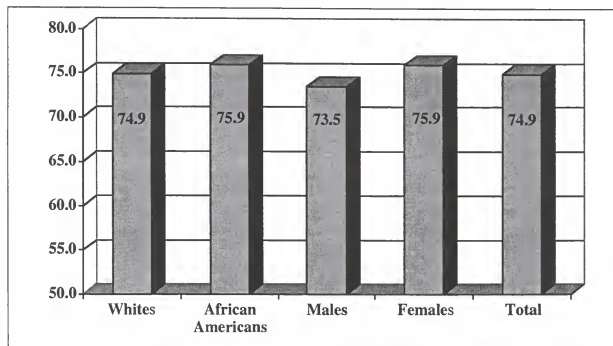
The majority in the total sample consisted of females (61%), and whites (84%). African Americans account for an additional 10%, other races for 1.5% and race was unknown for 4% of the sample. Analyses were conducted only on those individuals who were African American or white (total n=33,680). The average age of beneficiaries in the sample was 75 years. African Americans were significantly older than whites (76 years vs. 75 years respectively), probably

Figure 2-1: Sample population by years in study



reflecting the relative short life expectancy of African American males. Females in the sample were significantly older than males (76 years vs. 74 years respectively; see Figure 2-2), and females made up a significantly larger percentage of the African American population (63%) than they did in the white population (61%).

Figure 2-2: Age by ethnicity and gender, 1991-1993



Other Demographic Variables

While the physician files provided some of the basic demographics, a number of demographic variables had to be created by merging data from other sources. The billing records provided zip code, county of residence, and state of each beneficiary, but it did not provide such important information as whether the beneficiary lived in a rural or urban location, income, education, or socio-economic status. We used the following procedures to create social status and rural/urban variables.

Urban/Rural: Using the information provided in the 1990 Census, beneficiaries were coded as urban if the county in which they lived was designated as being within one of the seven Standard Metropolitan Statistical Areas (SMSAs) in Tennessee included Nashville, Memphis, Knoxville, Chattanooga, Jackson, Clarksville, and Tri-Cities) and are called urban. All others were coded as non-Standard Metropolitan Statistical Areas and labeled as rural for this study. The non-SMSA includes small cities and farming communities.

Income: Proxy values for per capita income were assigned to beneficiaries using the 1990 census. The per capita income for each zip code by race was assigned to each beneficiary according to his or her zip code. Beneficiaries with no per capita variable listed in the 1990 census were coded as missing. HCFA has also used income as a proxy for socioeconomic status (see Gornick et al., 1996). We were able to classify 32,727 of 33,735 (91.4%) of Tennessee Medicare beneficiaries according to income by ZIP code of residence in the census file. For whites, matching was 96.9% complete for income (29,204 of 30,136) and for African Americans, matching was 97.8% complete for income (3,521 of 3,599). Match failures were due to missing information in the census file, incorrect ZIP codes, or ZIP codes for which census information was excluded from the census file for reasons of confidentiality. Beneficiaries for whom matching information was unavailable were excluded from the analyses. Using analysis of variance, however, no significant differences emerged between matched and unmatched beneficiaries with regard to race, age, gender, residence or lack of residence in a Standard Metropolitan Statistical Area (SMSA), ZIP Code and utilization of services.

Education: Proxy values for education were also computed using the 1990 census. The percent of residents who had completed high school was assigned to each beneficiary according to their race zip code. Beneficiaries with no education in the 1990 census were coded as missing. We were able to classify 31,141 of 33,058 (94.2%) for education. For whites, matching was 98% for education (29,519 of 30,136). For African Americans, matching was 98.3% complete for education (3,539 of 3,599). Match failures were due to missing information in the census file, incorrect ZIP codes, or ZIP codes for which census information was excluded from the census file for reasons of confidentiality. Beneficiaries for whom matching information was unavailable were excluded from the analyses. Using analysis of variance, however, no significant differences emerged between matched and unmatched beneficiaries with regard to race, age, gender, residence or lack of residence in a Standard Metropolitan Statistical Area (SMSA), ZIP Code and utilization of services.

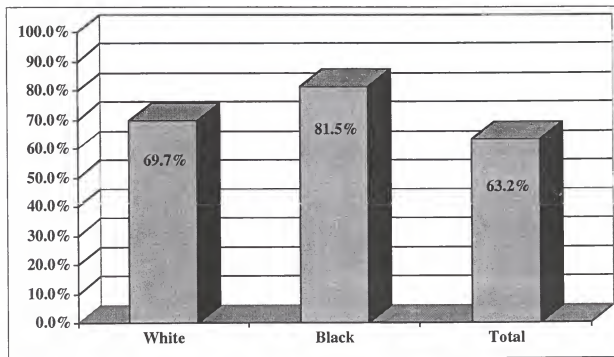
Socio-Economic Status (SES): An SES index was computed using percentile scores for education and income. These scores were then added together and averaged in order to create a SES scale. For those beneficiaries that had values for only education or per capita income, the percentile for the one available score was used. Beneficiaries for whom no income or education proxies were available in the 1990 census, they were coded as missing. This procedure follows the method employed by Gornick et al. (1996) in their analysis of HCFA data, and it also comes close to SES procedures employed by the ECA Catchment Area study as reported by Eaton & Kessler (1985); Robins & Regier (1990), and Holzer et al. (1995).

Income & Education Quartiles: For descriptive purposes, white and African American beneficiaries were separately assigned to one of four groups of approximately equal size according to per capita income level. This procedure was required because of the gross uneven distribution of African Americans in the income and education quartile when a single grouping criteria was used. White beneficiaries were distributed fairly evenly among the four income quartiles, but African American beneficiaries were quite unevenly distributed, with only 5.4% of the African American population appearing in the two upper income

quartiles for the sample as a whole. Similarly, while whites were distributed quite evenly with respect to educational level, only 31.2% of the African Americans appeared in the two upper quartiles for the sample as a whole. Finally, 81.4% of African Americans resided in an SMSA, while this was only true for 60.5% of whites. Income quartiles one through four, from lowest to highest, among African Americans were $\leq \$5,709$ (lower 25 percentile); $\$5,710 - 6,587$ (25.1 to 50.0 percentile); $\$6,588 - 7,301$ (50.1 to 75.0 percentile); and $\geq \$7,302$ (75.1 to 100 percentile). Corresponding values for whites were $\leq \$10,291$; $\$10,292 - 11,934$; $\$11,935 - 14,195$; and $\geq \$14,196$. Educational quartiles based upon percentage of high school education among African Americans were $\leq 53.2\%$; $53.3 - 57.8\%$; $57.9 - 65.8\%$ and $> 65.8\%$. Corresponding values for whites were: $\leq 56.8\%$; $56.9 - 64.1\%$; $64.2 - 75.0\%$; and $> 75.0\%$.

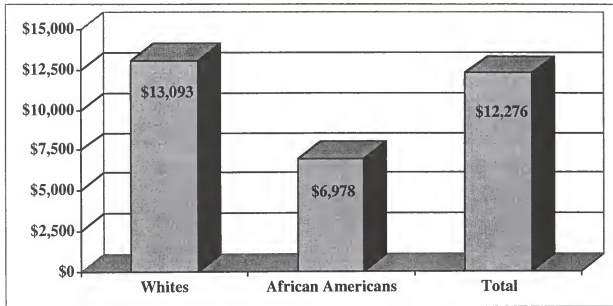
The above procedures resulted in 63.2% of the sample being classified as urban. African Americans were significantly more likely to live in urban areas than whites (81.5% vs. 60.7% respectively;), see figure 2-3). Females were also significantly more likely to live in urban areas than males (64.0% vs. 62.1% respectively).

Figure 2-3: Percent of the population in urban areas by race, 1991-1993



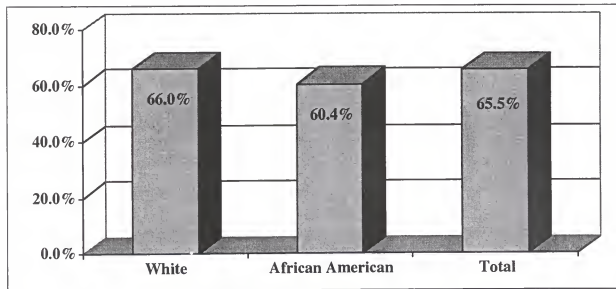
The mean per capita income for the sample was \$12,276. Whites had statistically higher per capita income than did African Americans in the sample (\$13,093 vs. \$6,978 respectively) see figure 2-4). There was also a difference in per capita income between males and females, with males having a slightly higher per capita income than females (\$12,348 vs. \$12,230 respectively).

Figure 2-4: Income by race, 1991-1993



Educational levels also revealed a significant difference with whites having significantly more education than African Americans (66.0% completed high school vs. 60.4% respectively). There were no differences in the education level by gender (see Figure 2-5).

Figure 2-5: Education by race, 1991-1993



Summary and Discussion

There are a number of limitations in this study. First, only individuals who visited a healthcare professional and were billed for that visit in a calendar year are included for any year. Therefore, beneficiaries with no illnesses during any year, or no doctor's visits do not appear. Rates of disorders are, therefore, somewhat inflated because they are based on only those beneficiaries who ever saw a physician. Secondly, we only have the rates of diagnoses. Undiagnosed disorders, especially in the case of mental illness, can have a significant effect on treatment costs; these differences cannot be addressed by this study. Thirdly, this is only data from Tennessee; an elderly individual who moved out of state during the period is lost to the study. Fourth, there are no mortality data; that is, when a beneficiary appears in an early year but does not appear in a succeeding year, we do not know if this beneficiary had no physician visits, moved away from Tennessee, or simply died. Fifth, proxy variables had to be assigned to beneficiaries for education and income based upon their zip code and race. Individual level data on education and income were not available. This procedure may mask some differences in service utilization by income, education, and SES because we have only the data for their neighborhoods and not by individual. Thus, given this handicap, it is difficult to discern patterns of service utilization by social class as reported by others (Holzer et al., 1986; 1995)

Finally, there are other limitations that are imposed by the data itself. The data were billing records and not medical records. Some medical information is simplified and made to conform to HCFA billing specifications. Confusion can result from the difference between physician and outpatient records. If a patient saw a physician but was billed from an outpatient clinic they were listed in the out-patient file. Similarly, if a patient received a procedure usually handled in out-patient clinics in a physician's office, and billed by the physician they were listed in the physician file. In addition, an unknown percentage of the data could be inaccurate because reimbursement for particular procedures and diagnoses differ widely, giving an incentive to report the most remunerative diagnosis for a set of possible diagnoses, rather than the most accurate diagnosis. The data supplied on the billing unit was incomplete. Procedures were often left blank so while there was a diagnosis there was no way to determine what procedure was used. This is especially evident in the 1991 data set.

Chapter 3

Race, Diagnoses, And Service Utilization

Introduction

Studies of health and mental health status among the general population have shown that race has a strong effect on morbidity rates for various types of diseases including strokes, kidney problems, diabetes, cancer, cardiovascular disorders, AIDS, and sickle cell disease. The rates are higher for African Americans than whites (Barnett, Armstrong, and Casper, 1997). In the area of mental health, racial effects have not been consistent (Howard, Cornille, Lyons, Vessey, et al., 1996). Below is a review of some of the studies that have a direct bearing relative to the relationship between race and psychiatric morbidity.

Race and Psychiatric Disorders

The relationship between race and mental illness has been of long interest to both researchers and service providers. Studies examining the effect of race have been conducted on untreated and treated individuals. While some of the studies of treated cases reported no significant racial differences (Pasamanick, 1963; Simon, 1965), others found higher rates of disorders among African Americans and attributed this difference to socio-cultural changes and greater urbanization. Studies of untreated populations based upon symptom scales also reported mixed results. Initially higher rates of symptomatology among African Americans than whites were reported and when socio-economic status, age, and sex was controlled in the analyses, the racial differences in symptomatology observed earlier disappeared (Warheit, Holzer, Schwab, 1973; Warheit, Holzer, & Arey, 1975; Gift and Harder, et al., 1985; Neff & Husaini, 1987; Hargrave et al., 1998; Pastenak et al., 1998). However, data on treated cases relative to specific diagnoses show that, while whites have higher rates of alcoholism and depression (Davis & Jones, 1973), African Americans have higher rates of schizophrenia and other psychosis (Pavkov et al., 1993; Davis, 1975; Flakerud & Hu, 1992). It is not clear whether or not such differences reflect cultural differences between African Americans and the predominantly white corps of psychiatrists in the U.S. The rates of dementia were similar among African Americans and whites (Fillenbaum et al., 1998). Recently, for example, Holzer, Swanson, and Shea (1995) reported that prevalence of any psychiatric disorder (in the Epidemiological Catchment Area study data) was higher among African Americans than whites, and that these higher rates in particular existed for schizophrenia, phobias, and cognitive impairment. These significant racial differences remained intact when controls for SES, age, and sex were instituted in the analyses (Holzer et al., 1995). Holzer and colleagues further state that the higher risk of psychiatric disorders among African Americans may be due to their low status, but SES by itself is not sufficient to explain all the racial differences observed in the study. Nonetheless these racial differences may have existed due to (i) differences in assessment methodologies, (ii) differences in particular stressors affecting racial groups in the population, or (iii) African Americans and whites display symptomatology in different

ways but clinicians are unaware of such cultural differences (Neighbor et al., 1989; Holzer et al., 1995).

Psychopathology among Medicare Elderly

For the present study, a five percent sample was drawn from among Tennesseans with Medicare Part A and Part B coverage who saw a physician and for whom HCFA received a bill in 1991, 1992, and 1993. Billing data from physician, hospital, nursing home, and hospice billing files were combined to create a master file of psychiatric diagnoses and mental health services utilization. The calculation of rates for treatment is based upon a three year prevalence rate with a total of 5,339 elderly, including whites (n = 4,795) and African Americans (n = 544) who had received at least one psychiatric diagnosis. The overall prevalence rate of psychiatric disorder for this sample amounted to 158.5 per 1000 elderly for the three year period.

Table 3-1 shows race specific prevalence and for overall and for selected major diagnostic categories for the period 1991-1993. African Americans had significantly

Table 3-1: Rates per 1000 for major diagnostic categories by race, 1991-93

Diagnosis	White (n=30,081)	African American (n=3,599)	Total (n=33,680)
Diabetes	149.5	227.0*	157.5
Heart Disease	421.9*	399.6	419.5
Hypertension	391.1	539.6*	407.0
Stroke	143.7	157.0*	145.2
Arthritis	486.9	468.9	485.0
Cancer	212.7*	124.8	203.3
Dementia	39.4	50.0*	40.6
Organic Psychosis	27.9	39.7*	29.1
Substance Abuse	7.6	9.7	7.8
Schizophrenia	4.1	6.7*	4.3
Mood	40.4*	24.2	38.7
Anxiety	59.0*	35.6	56.5
Any Psychiatric Diagnosis	159.4	151.2	158.5
Comorbidity	40.2	37.0	39.9

* Significant at $p \leq .05$

higher rates of diabetes than whites (227.0 vs. 149.5 per thousand respectively), hypertension (539.6 vs. 391.1 per thousand respectively), and stroke (157.0 vs. 143.7 per thousand respectively). Whites on the other hand had higher rates of heart disease than African Americans did (421.9 vs. 399.6 respectively) and cancer (212.7 vs. 124.8 per thousand respectively).

No statistically significant overall difference was found between African Americans and whites in the prevalence of overall rates of psychiatric disorders. Rates ranged from a low of 151.2 per 1000 African Americans to a high of 159.4 per 1000 whites during the three year period. Similarly, there was no significant difference in the rate of mental comorbidity.

Statistically significant differences did exist between whites and African American with regard to the major psychiatric diagnostic categories appearing in Table 3-1. Whites had significantly higher rates of mood and anxiety disorders throughout the study period. More specifically, as compared to rates for mood disorders among African Americans, rates of mood disorders among whites were sixty six percent higher 1991-1993 (24.2 vs. 40.4 per thousand respectively). Similarly, with regard to anxiety/phobia disorders, as compared to African Americans, whites also displayed significantly higher rates by sixty nine percent (59.0 vs. 35.6 per thousand respectively).

African Americans were diagnosed with a significantly higher rate of schizophrenia than whites (63% higher) in the three year period. Rates of dementia diagnosis were approximately twenty-seven percent higher for African Americans compared with whites in and 42% higher for organic psychosis. There are no significant differences by race with substance abuse.

Race and Specific Diagnoses

To get a more detailed picture of racial differences in mental disorders, we divided the major diagnostic categories by their component diagnoses and compared rates across racial groups (see Table 3-2). Rates of dementia were significantly higher among African Americans (50.0 vs. 39.4 per thousand respectively) as compared to whites and this racial difference was probably due to significantly higher rates of other organic psychoses among African Americans than whites (13.9 vs. 7.7 per thousand respectively).

Alcoholic and drug psychoses, alcohol and drug dependence, and non-dependent drug abuse comprise the major diagnostic category of substance abuse. Rates of alcoholic psychosis were somewhat higher for African Americans (1.4 vs. 1.1 per thousand respectively) than for whites and alcohol dependence was significantly higher and drug psychoses and drug dependence (5.6 vs. 1.6 per thousand respectively) Whites had higher rates of non-dependent drug abuse and drug psychoses but these differences were not significant.

Table 3-2: Specific mental health diagnostic rates per 1000 by race, 1991-1993

Diagnosis	White	African American	Total
	(n=30,081)	(n=3,599)	(n=33,680)
Dementia	39.4	50.0*	40.6
Alcoholic Psychoses	1.1	1.4	1.1
Drug Psychoses	1.4	0.6	1.3
Trans. Organic Psych.	10.7	10.6	10.7
Other Organic Psych.	7.7	13.9*	8.4
Schizophrenia	4.1	6.7*	4.3
Affective Psychosis	23.0*	12.5	21.9
Paranoiac States	1.1	0.6	1.0
Other Non-organic	27.1	31.1	27.5
Neurotic Disorder	52.2*	29.2	49.7
Personality Disorder	0.9	1.1	0.9
Sexual Deviation	2.5	1.4	2.4
Alcohol Dependence	1.6	5.6*	2.0
Drug Dependence	0.6	0.0	0.6
Drug/Alcohol Abuse	2.9	2.2	2.8
Psycho-Physiological	1.5	1.9	1.6
Special Syndromes	9.0	6.1	8.7
Acute Reaction Stress	2.6	1.7	2.5
Adjustment Reaction	6.7	6.7	6.7
Non Psychotic Mental	12.1	19.2*	12.9
Depressive Disorder	23.3*	14.4	22.4

* Significant at $p \leq .05$

Analysis of schizophrenia revealed a significant difference between African Americans and whites (6.7 vs. 4.1 per thousand respectively) By contrast, there were no significant differences between African Americans and whites for paranoiac states (0.6 vs. 1.1 per thousand respectively) and other non-organic disorders (31.1 vs. 27.1 respectively).

Of the three specific mood disorders examined in this analysis, racial differences in affective psychosis and depressive disorder appear to account for major differences between African Americans and whites. Whites were diagnosed with significantly higher

rates of both affective psychosis (23.0 vs. 12.5 per thousand respectively) and depressive disorder (23.3 vs. 14.4 per thousand respectively) than were African Americans.

In summary, racial differences in prevalence of psychiatric diagnoses do exist, and to examine these thoroughly requires looking beyond the prevalence of mental health disorders. While there were no significant difference in the overall rate of psychiatric disorders, African Americans had significantly higher rates of diagnosis for physical base mental disorders (dementia, organic psychosis, and schizophrenia) while whites had significantly higher rates for mood and anxiety disorders. Very often, as shown by Tables 3-1 and 3-2 above, aggregating psychiatric diagnoses muddles the race effect.

Race and Service Utilization

Previous research suggests that minorities have relatively low mental health service utilization rates (Hough et. al., 1987; Black, Rabins, German, McGuire and Roca, 1997). A recent analysis of medical services utilization data reported by HCFA showed that African American beneficiaries of Medicare underutilized services (e.g., number of visits to physicians) and that those in the lower income category utilized both ambulatory and acute services least. Both race and low socioeconomic status were the strongest predictors of lower use of certain services paid for by Medicare (see Summary Report to Congress: Monitoring the Impact of Medicare, Physician Payment Reform on Utilization and Access, 1995). In contrast, other recent reports indicate that the African Americans, poor and working class, have high need for mental health services (Black, Rabins, German, McGuire, and Roca, 1997).

Some argue that attitudinal and service system barriers may prevent minorities from utilizing mental health services (Padgett, Patrick, Burns, and Schlesinger, 1994; Snowden and Hu, 1997). It has also been suggested that differential use of services among ethnic groups may be associated with stigmas attached to mental illness, with acceptance of such problems occurring due to age, with age discrimination, or with access barriers to services (Lebowitz, 1986; Lebowitz, Light and Bailey, 1987).

When African Americans do utilize mental Healthcare services, they choose different kinds of services--preferring to seek emergency services over "individual" or group treatment (Maynard, Ehet, Cox, Peterson, and McGann, 1997). Some explain this as a result of limited resources, cultural differences in illness management and social reaction to illness and race (Primm, Lima and Rowe, 1996; McNeil and Kennedy, 1997). We examine these issues by examining data on service utilization.

Indicators of service utilization include the number of respective emergency inpatient visits, inpatient days, inpatient mental health days, outpatient visits, skilled nursing care days, and hospice days, and physician visits (see Table 3-3). Furthermore, with only two exceptions, African Americans in this sample used more services compared with whites. Rates of inpatient emergency service utilization were significantly higher for African Americans compared with whites (652.6 vs. 564.3 per thousand respectively). African Americans also had significantly higher mean number of inpatient days than whites (8.9 vs. 6.4 respectively). African Americans

Table 3-3: Service utilization among psychiatric diagnosed persons by race, 1991-1993

Treatment Site	White	African American	Total
Rate Per Thousand	(n=4,795)	(n=544)	(n=5,339)
Emergency Room Visits	564.3	652.6*	573.3
Skilled Nursing Days	139.3	150.7	140.5
Home Health	342.4	415.4*	349.9
Hospice days	6.7	7.4	6.7
Inpatient Mental Days	884.8	1,115.2	908.3
Mean			
Inpatient Days	6.4	8.9*	6.7
Outpatient Visits	3.0	2.8	2.9
Physician Visits (Mean)	23.0	21.7	22.9

* Significant at $p \leq .05$

also showed a significantly higher rate of home health utilization days than whites (415.4 vs. 342.4 per thousand). While African Americans showed higher service utilization rates for skilled nursing visits, hospice days and inpatient mental day, the differences were not significant. Whites exhibited higher service utilization on only two indicators, physician visits and outpatient visits. These differences were not significant.

Consistent with previous findings (Moos and Mertens, 1996), our data (see Table 3-4) show that the elderly tend to use more inpatient services compared to outpatient services. The mean costs of inpatient services are greater than the mean costs of all other aspects of Healthcare combined. In only one instance, outpatient costs, were the costs of treatment higher for whites than for African Americans, but this difference was not significant. African Americans had significantly higher costs for inpatient services (\$8,977 vs. \$7,309 respectively), total mental health costs (\$1,123 vs. \$824 respectively), total non-mental health costs (\$13,556 vs. \$11,605 respectively), and for total health costs (\$14,680 vs. \$12,430 respectively).

Table 3-4: Mean healthcare costs among psychiatric diagnosed persons by race, 1991-1993

Treatment Site	White	African American	Total
	(n=4,795)	(n=544)	(n=5,339)
Inpatient	\$7,309	\$8,977*	\$7,479
Outpatient	\$1,137	\$1,084	\$1,132
Physician	\$1,901	\$2,125	\$1,924
Other	\$2,082	\$2,493	\$2,124
Total Mental Health	\$824	\$1,123*	\$855
Total Non Mental Health	\$11,605	\$13,556*	\$11,805
Total Cost	\$12,430	\$14,680*	\$12,659

* Significant at $p \leq .05$

Race and Specialty Providers

This project examined rates of utilization of various provider specialties including neurology, psychiatry, geriatric, psychology, clinical psychology and other specialty services for African Americans and whites (see Table 3-5). There were no significant

Table 3-5: Rates of visits to specialty among psychiatric diagnosed persons per 1000 by race, 1991-93.

Specialty	White	African American	Total
	(n=4,795)	(n=544)	(n=5,339)
General Practice	7,498.1*	6,438.4	7,498.1
Neurology	324.1	251.8	316.8
Psychiatry	671.8	698.8	674.5
Geriatric	29.8	19.3	28.7
Psychologist	100.5	255.2*	116.3
Other Specialty	14,259.6	14,059.1	14,239.2

* Significant at $p \leq .05$

differences in the utilization of neurology, psychiatry, geriatric or other specialty services between African Americans and whites. Whites had a significantly higher utilization rate of general practice physicians than did African Americans (7,498.1 vs. 6,438.4 per thousand respectively). African Americans, on the other hand, had a significantly higher rate of services from psychologists (255.2 vs. 100.5 per thousand respectively). The rate of services used by African Americans from psychologists is more than twice that of whites.

Summary and Discussion

This analysis shows that rates of all psychiatric illnesses observed among Tennesseans were within the ranges reported for other areas in the United States (Chacko, 1989). Results reported above were also consistent with prevalence rates calculated from data obtained through surveys of Tennesseans (Husaini, Castor, Linn, Whitten-Stovall, and Nesar, 1988). The overall prevalence rate of mental health diagnoses for African Americans and whites is not significantly different. However, a more detailed examination of the data reveals significant differences between African Americans and whites. African Americans have significantly higher rates of dementia, organic psychosis, and schizophrenia, while whites have significantly higher rates of mood (depression) and anxiety disorders. While there are no significant difference between African Americans and whites in total substance abuse, African Americans show higher rates of alcohol psychosis and alcohol dependence, while whites show a higher rates in drug psychosis and drug dependence. Only alcohol dependence reveals a significantly higher rate of incidence among African Americans.

Interestingly, African Americans with mental disorders used significantly more inpatient services, emergency room services and home health services. These differences are evident whether one examines number of visits, number of days, or cost. Whites showed more physicians visits than did African Americans, but African Americans showed a higher average cost. These differences, however, were not significant.

Finally, whites showed a significantly higher rate of service utilization among general practitioners and internists. By contrast, African Americans had a significantly higher utilization rate for psychologists. The rate of African Americans was more than double that of whites.

Chapter 4

Gender, Age, And Service Utilization

In this chapter, we focus on the effect of gender and age categories on psychiatric diagnoses, service utilization, and healthcare costs. The basic issue to be examined is whether male and female beneficiaries differ by diagnoses and cost of treatment and whether the differences observed with regard to gender also exist for the beneficiaries who are old-old (81+ years) or young-olds (65-70 years of age).

Gender and Chronic Medical Conditions

The diagnoses were coded according to the International Classification of Diseases, or ICD-9 and they were taken from reimbursement files relative to physician, inpatient, outpatient, home health, hospice, and skilled nursing services. Separate variables were created for each of the major diagnostic groups and the number of billings and total costs for each of these diagnoses were computed when the data was aggregated. In addition important diagnoses such as hypertension, heart disease, stroke, arthritis, diabetes, major types of cancer, and mental health disorders were aggregated separately.

Table 4-1 shows that, of five medical conditions, gender differences existed with regard to the prevalence of heart diseases, hypertension, cancer, and arthritis. Only in the area of strokes rates were similar between males and females (14.2% vs. 14.5% respectively). Of the other major diagnoses, however, there were significant gender differences. For instance, males had higher rates than females relative to heart diseases (44.5% vs. 39.7%) and cancer (24.3% vs. 15.6%). In contrast, females had higher rates than males for arthritis (53.6% vs. 39.8%) and hypertension (44.8% vs. 34.0% respectively).

Table 4-1: Percent of elderly with chronic conditions by gender, 1991-93

Conditions	Males (n=13,203)	Females (n=20,477)	Total (n=33,680)
Heart Disease	44.5%*	39.7%	41.5%
Hypertension	34.0%	44.8%*	40.6%
Stroke	14.2%	14.5%	14.4%
Cancer	24.3%*	15.6%	20.2%
Arthritis	39.8%	53.6%*	48.4%

* Differences significant at $p \leq .05$

Gender and Service Utilization

Service utilization is determined by (i) volume of services (kind and number of times services were used), and (ii) the total costs of services provided to beneficiaries. For instance, with regard to physicians' services, both the number of visits per calendar year and the cost of the services provided were computed. Since reimbursement data provided to us were only on those elderly who had used medical services, we were unable to determine the percentage of the population that had not seen a physician. Thus, it is assumed that one hundred percent of the sample had seen a physician within the three-year time period. Further, it was possible to determine the percentage of the population that used other medical services, though this number is an overestimate due to the fact that individuals who had not seen a physician were never included in the sample. Nevertheless, it is possible to examine the percentage of the sample population that had used services such as inpatient, outpatient, emergency, skilled nursing, home health, and hospice care. Table 4-2 shows that a larger percentage of males (44.8%) than females (41.4%) used inpatient services. This difference was significant. Similarly, a significantly larger percentage of males than females used emergency room services (35.6% vs. 24.3% respectively). By contrast, females were significantly more likely than males to use outpatient services (78.0% vs. 71.7%), home health services (23.1% vs. 18.2%), and skilled nursing services (5.9% vs. 4.0% respectively). There were no significant differences in the usage of hospice services which was used by less than 1% of each gender.

Table 4-2: Percent of services used by gender, 1991-1993

Services	Males	Females	Total
	(n=13,203)	(n=20,477)	(n=33,680)
Inpatient	44.8%*	41.4%	42.7%
Emergency Rooms	35.6%*	24.3%	35.0%
Outpatient	71.7%	78.0%*	75.5%
Home Health	18.2%	23.1%*	21.2%
Skilled Nursing	4.0%	5.9%*	5.2%

* Differences significant at $p \leq .05$

Additionally, we analyzed the volume of services used (number of visits to outpatient clinics and physicians office) and days hospitalized to determine service utilization (see Table 4-3). On the average, males spent more days in the hospital than did females (3.7 days vs. 3.1 days respectively). In contrast, females averaged significantly more outpatient visits (2.0 vs. 1.7 respectively) and visits to physicians than did males (15.3 vs. 14.5 respectively).

Table 4-3: Volume of services used by gender, 1991-1993

Service	Males	Females	Total
	(n=13,203)	(n=20,477)	(n=33,680)
Inpatient days	3.7*	3.1	3.4
Outpatient Visits	1.7	2.0*	1.9
Physician Visits	14.5	15.3*	15.0

* Differences significant at $p \leq .05$

Another measure of service utilization was the average cost incurred by the beneficiaries. The cost of physicians, in-patient services, out-patient services and total services expended were analyzed. Table 4-4 shows that males had significantly higher average costs for these services than did females. For instance, males had higher inpatient costs than females (\$5270 vs. \$3878). Similarly, males also had higher physicians' cost than females (\$1,351 vs. \$1,236 respectively), despite the fact that females had more trips to the physicians. Even though females made more visits to outpatient clinics, the cost of outpatient services was higher for males than for females (\$820 vs. \$781 respectively). In only one cost category, "other costs," did females have a higher cost of service than did males (\$1,244 vs. \$881 respectively). This "other costs" category included the cost of home healthcare, skilled nursing, and hospice care. A larger percentage of women, than men, used home healthcare and hospice services. Finally, the total cost of healthcare was significantly higher for males than for females (\$8,322 vs. \$7,140 respectively).

Table 4-4: Mean service costs by gender, 1991-1993

Costs	Males	Females	Total
	(n=13,203)	(n=20,477)	(n=33,680)
Physician Costs	\$1,351*	\$1,236	\$1,281
Inpatient Costs	\$5,270*	\$3,878	\$4,423
Outpatient Costs	\$820*	\$781	\$796
Other Costs	\$881	\$1,244*	\$1,102
Total Health Costs	\$8,322*	\$7,140	\$7,603

* Differences significant at $p \leq .05$

Gender and Cost of Specific Medical Conditions

Earlier we presented prevalence of specific chronic medical conditions by gender. We now present the cost variations by gender in treating these conditions. Table 4-5 shows that male beneficiaries with any of the five major medical condition cost significantly more than females. For instance, the average total cost of medical treatment for males with heart disease was \$12,950 as compared to \$11,897 for females with the same condition. Similarly, the costs were higher for males than females for treating stroke (\$16,625 vs. \$14,412 respectively), cancer (\$11,737 vs. \$10,383 respectively), and arthritis (\$9,454 vs. \$8,008 respectively). As compared to the female, the male costs \$1,270 more to treat the condition of hypertension, \$2,213 more for stroke, \$1,446 more for cancer, and \$1,446 for arthritis. Briefly, males in every medical condition cost significantly more to treat than females.

Table 4-5: Healthcare cost of beneficiaries with chronic medical conditions by gender, 1991-1993

Conditions	Males	Females	Total Sample
	(n=13,203)	(n=20,477)	(n=33,680)
Heart Disease	\$12,950*	\$11,897	\$12,335
Hypertension	\$8,689*	\$7,419	\$7,832
Stroke	\$16,625*	\$14,412	\$15,259
Cancer	\$11,737*	\$10,383	\$11,016
Arthritis	\$9,454*	\$8,008	\$8,455

* Differences significant at $p \leq .05$; + Differences Significant at $p \leq .10$

Gender and Mental Disorders

In the area of mental disorders, five different major categories of mental disorders were analyzed for those who had received at least one psychiatric diagnosis. These diagnostic categories consisted of dementia, organic psychosis, schizophrenia, mood disorder, and anxiety/phobia disorders. For these diagnoses, rates per 1,000 of those with any mental disorder were compared for gender differences.

Data in Table 4-6 indicate that while overall prevalence rate of any disorder in the sample was higher among females than males (17.7% vs. 13.3% respectively), gender differences varied with regard to specific diagnostic categories. We also examined the rate of mental comorbidity; among those who had any mental diagnosis, we determined the number of cases that had been given two or more psychiatric diagnoses within the same calendar year. Of 5,339 patients who received a psychiatric diagnosis, 39.4 per 1000 received two or more diagnoses during the same calendar period. Computed this

way, we found gender differences in comorbidity in that females had a much higher rate of comorbidity (44.7 per 1000) than males (31.1 per 1000).

Prevalence of rates of specific disorders is based upon per 1000 diagnosed cases of mental illness. Table 4-6 also shows that while gender differences were non-existent with regard to the rate of schizophrenia, for the remaining four diagnoses, females were significantly more likely to be diagnosed with these mental disorders than were males. For instance, rates of dementia was 46.1 per thousand for mentally ill females, it was 30.1 per thousand for males. Similarly, the rate for organic psychosis was 30.3 per thousand for females vs. 25.6 per thousand for males. The largest differences were found for mood and anxiety disorders. The rate of mood (inclusive of bipolar, dysthymia, and major depression) disorder among females was almost twice that among males (46.9 vs. 26.1 respectively). Similarly, the rate for anxiety disorder was 67.3 per thousand for females and 37.6 per thousand for males.

**Table 4-6: Rates of specific mental disorder
per 1,000 diagnosed cases by gender, 1991-1993**

Disorders	Males	Females	Total
	(n=13,203)	(n=20,477)	(n=33,680)
Any Mental Disorder	13.3% (n=1762)	17.7%* (n=3627)	15.8% (n=5339)
Rate per Thousand			
Comorbidity	31.1	44.7*	39.4
Dementia	30.1	46.1*	39.9
Organic Psychosis	25.6	30.3*	28.5
Schizophrenia	30.0	32.3	31.4
Mood Disorder	26.1	46.7*	38.7
Anxiety Disorder	37.6	67.3*	55.8

* Differences significant at $p \leq .05$

Gender and Service Utilization

An analysis of data pertaining to services used by the beneficiaries shows that males with psychiatric illness had longer hospitalization than females (6.6 days vs. 5.4 days respectively) as well a higher utilization of emergency services (60% males vs. 56% respectively). While gender differences did not exist with regard to visits to physicians, females averaged more outpatient clinics visits as compared to males (3.1 visits than 2.7 visits respectively).

Gender and Cost of Mental Services

A similar cost trend favoring higher costs for males was also evident for the elderly with mental disorders (see Table 4-7). The total cost for male beneficiaries with any mental disorder was \$13,973 as compared to \$12,039 for females. Similarly, the total cost for men with mental comorbidity was significantly higher than for female comorbid (\$17,263 vs. \$15,257 respectively). Further, treatment costs were also higher for males than females in two diagnostic categories, namely organic psychosis (\$18,988 vs. \$16,634) and dementia (\$16,661 vs. \$13,518 respectively). The gender differences for schizophrenia, mood, and anxiety disorders were non-existent (see Table 4-7). It is important to note that for every psychiatric disorder, men on the average were more expensive to treat as compared to their female peers. On the average, men cost \$1205 more for the treatment of anxiety, \$1778 more for treating mood disorder, and \$2354 more for treatment of organic psychosis, and \$3143 more for dementia as compared to their female peers with similar diagnoses.

Table 4-7: Healthcare cost of specific mental disorders by gender, 1991-1993

Diagnosis	Males (n=13,203)	Females (n=20,477)	Total Sample (n=33,680)
Any Mental Disorder	\$13,973*	\$12,039	\$12,659
Mental Comorbid	\$17,263+	\$15,257	\$15,872
Dementia	\$16,661*	\$13,518	\$14,445
Organic Psychosis	\$18,988*	\$16,634	\$17,462
Schizophrenia	\$15,614	\$15,447	\$15,508
Mood Disorder	\$15,103	\$13,325	\$13,789
Anxiety Disorder	\$11,975	\$10,770	\$11,083

* Differences significant at $p \leq .05$; + Differences significant at $p \leq .10$

Summary and Discussion of Gender

There are important differences in the prevalence of disorders and service utilization by gender. Males, as compared to females, are more likely to be hospitalized and use emergency services. By contrast, females are more likely to use physician, outpatient, home health, and skilled nursing services. The use of more inpatient and emergency service results in men having higher cost in these areas as well as in the total cost than females. Interestingly, even though men use physician and outpatient services at a lower rate than females, their costs are still higher in these areas. This seems to support the view that men avoid using medical services until the problem is more severe, leading to more expensive care from the physician and outpatient services as well as

higher use of emergency and inpatient services. This finding is further supported by the analyses concerning total cost of treatment by diagnoses. For each of the five major physical diagnoses we examined; heart disease, hypertension, stroke, cancer, and arthritis, the total cost of treatment for males was significantly higher than for females. Similarly, the total treatment cost for males with mental disorders was also higher. This difference was significant for any mental diagnoses, comorbid mental diagnoses, dementia, and organic psychosis. In the other three mental diagnoses examined, men had a higher total cost than did women. In only one diagnosis, schizophrenia, did the total cost for male beneficiaries come within \$500 of those for females. It is interesting to note that this is the only major mental diagnosis (schizophrenia) in which males and females did not differ in the prevalence rates.

The cost analyses support the idea that men fail to seek treatment as early as females for both physical and mental disorders. This failure of men to seek early treatment results in more severe conditions may lead to increased utilization of more expensive health services (i.e. inpatient and emergency services).

Mental Disorders and Age Categories

Previous studies have reported a positive correlation between age and number of medical problems and psychiatric symptoms; with increasing old age, individuals experience increasing number of medical and psychiatric problems including dementia and psychotic symptoms (Husaini & Linn, 1985; Bazargan & Hamm-Baugh, 1995; Husaini, 1997; Brodaty et al., 1997; Thorpe, 1997). Further, among the depressed elderly, their current depression is predicted by their previous episodes of depression, and this holds true for both gender and race (Husaini, 1997).

Recently, a total of five (5) studies have examined differences between young-old and old-old and their findings are inconsistent regarding age effects among the elderly. For instance, two studies reported no differences between the age categories regarding (i) health status, (ii) indices of psychological well-being, and (iii) social network (Heidrich, 1996), or expectations about counseling (Lagana, 1995). In contrast, three studies reported significant differences between young-olds and old-olds. For instance, Graham and colleagues (1996), reported greater alcohol use among young-old than old-old; this was particularly true for males who drank to pass the time and females who drank to reduce depression. In another study, Menec & Chipperfield (1997) reported that perceived control varied by age category in that among old-olds as compared to young-olds, perceived control was related to lower rates of hospitalization and mortality. And finally, Burnette & Mui (1997) reported that among Hispanic, old-old elderly had more psychological distress than young-old and that different factors accounted for distress in the two age categories. Among the old-olds, distress was elevated by unmet health needs and lower church contacts while distress among the young-olds was increased by family conflicts.

The purpose of this analysis is three-fold: (i) to examine prevalence of psychiatric disorder by age categories (young-old vs. old-old) and delineate rates of psychiatric diagnoses that characterize each age category; (ii) to determine whether specific diagnoses vary by race within each age category; and (iii) to determine whether

healthcare costs is affected by age and by race among the Medicare elderly with psychiatric morbidity.

We examined these three issues with the data reimbursement files of 33,680 beneficiaries in 1991-93 who on the average were 77 years old, predominantly white (90%), females (70%), with a per capita income of \$13,200. The elderly with psychiatric illness (n=5339) were sub-divided into three age categories: (i) 65-70 years old (n=1373); (ii) 71-80 years old (n=2114); and (iii) Over 80 years old (n=1852). In this analysis, the first age category (65-70) is considered to be young-old while the last category (over 80 years) is regarded to be old-old.

Specific Psychiatric Disorders by Age Categories

Table 1 shows that overall prevalence of any psychiatric disorder was higher among old-olds as compared to young-olds (23.1% vs. 11.1% respectively). Further, this age-related variation in the prevalence rate existed within each racial group. For example, white old-olds compared to their young-old peers had higher rates (23.7% vs. 11.7%) of psychiatric disorder. Similarly, among African Americans, higher rates of specific psychiatric disorder existed among the old-olds as compared to young-olds (22.5% vs. 10.2% respectively). In brief, beneficiaries in the old-old category had higher rates of mental illness regardless of their race. This finding is very similar to those reported for old-old Hispanics by Burnette & Mui (1997).

Table 4-8: Prevalence of psychiatric disorders by age category among white and African American beneficiaries, 1991 - 1993

Disorder	Age		
	65-70	71-80	81+
Whites	(n=10,691)	(n=12,516)	(n=6,874)
Any Mental Disorder	11.7%	15.3%	23.7%*
	(n=1,254)	(n=1,913)	(n=1,628)
Dementia	6.6%	20.6%	43.5%*
Organic psychosis	8.2%	16.2%	26.2%*
Schizophrenia	12.5%	18.9%	25.6%*
Mood disorder	33.2%*	29.2%	14.8%
Anxiety disorder	46.9%*	42.3%	23.2%

* Significant difference at $p < .05$

Table 4-8: Prevalence of psychiatric disorders by age category among white and African American beneficiaries, 1991 - 1993, Cont.

Disorder	Age		
	65-70	71-80	81+
African Americans	(n=1,163)	(n=1,440)	(n=996)
Any Mental Disorder	10.2%	14.0%	22.5%*
	(n=119)	(n=201)	(n=224)
Dementia	16.0%	29.9%	45.6%*
Organic Psychosis	11.8%	26.9%	33.5%*
Schizophrenia	20.2%	24.9%	26.8%
Mood Disorder	21.8%*	18.9%	10.7%
Anxiety Disorder	33.6%*	22.4%	19.2%

* Significant difference at $p < .05$

During 1991-93, while old-olds as compared to young-olds had higher rates of dementia, organic psychosis, and schizophrenia, the young-olds in contrast had higher rates of depression and anxiety (see Table 4-8). Further analysis revealed existence of a similar trend among both white and African American beneficiaries; very old beneficiaries (old-olds) tended to manifest more dementia, organic psychosis, and schizophrenia while their younger peers (i.e., young-olds) had more depression and anxiety.

Service Utilization by Age Categories

Volume of services was examined for both the entire sample of beneficiaries and then for those with any psychiatric diagnosis. Table 4-9 indicates that on the average, the old-old beneficiaries (age 81 years +) were heavy users of all types of services as compared to young-olds (age 65-70). This included inpatient services (58% vs. 31%), emergency rooms services (51% vs. 24%), outpatient services (79% vs. 70%), home health (37% vs. 11%), and skilled nursing (12% vs. 2%).

Table 4-9: Percent of Services related to mental conditions used by age category, 1991-1993

Services	65-70 Years.	71-80 Years.	81+ Years.
Inpatient	31%	44%	58% *
Emergency	24%	35%	51%
Outpatient	70%	79%	79%*
Home Health	11%	22%	37% *
Skilled Nursing	2%	5%	12%

* Differences significant at $p \leq .05$

We examined service utilization by age category among those with psychiatric problems. Table 4-10 indicates the old-old group had a similar pattern of service utilization as observed for the chronic medical conditions in the total sample; old-old elderly with psychiatric problems had longer hospital stays (7.3 days vs. 5.5 days), more emergency room visits (.7 vs. .4 visits), more skilled nursing and home healthcare than their younger peers. This pattern of service utilization is statistically consistent for all services utilized. The longer hospital stay for the old-old category is similar to the findings on older medically ill patients with major depression who had longer hospital stay and consumed more health resources (Koenig, Shelp, Goli, Cohen, Blazer, 1989; Callahan & Wolinsky, 1995).

Table 4-10: Volume of services used by age category among those with mental diagnoses, 1991-1993

Services	Age categories		
	65-70	71-80	81+
Inpatient Days	5.5	6.9	7.3*
Emergency Visits	.4	.5	.7*
Outpatient Visits	2.9	2.9	3.1
Physician Visits	21.5	23.7*	22.9
Skilled Nursing Visits	1.5	3.4	5.2*
Home Health Visits	.9	1.5*	1.3

* Differences significant at $p \leq .05$

Healthcare Costs by Age Categories

Table 4-11 shows that the total healthcare costs did not differ significantly between the young-olds and old-olds (\$12,826 vs. \$11,260 respectively), and neither did the cost vary between the two age categories among the Whites (\$12,495 vs. \$11,220 respectively), or among the African Americans (\$15,237 vs. \$11,683 respectively). These results were similar for various types of services except for outpatient services which showed higher cost for younger white elderly in comparison to old-old (\$1254 vs. \$982 respectively). Inpatient costs were generally higher for old-old primarily due to their longer hospitalization. However, when racial groups were compared within each age category, significant differences in healthcare costs

Table 4-11: Healthcare costs by services in age category, 1991 - 1993

Services	Age		
	65-70	71-80	81+

All Elderly

Inpatient	\$6,838	\$8,077*	\$7,271
Outpatient	\$1,253*	\$1,178	\$790
Physician	\$1,863	\$1,997	\$1,885
Other	\$1,305	\$2,169	\$2,681*
Mental	\$846	\$926	\$779
Non-Mental	\$10,413	\$12,493*	\$12,047
Total	\$11,260	\$13,421	\$12,826

White Elderly

Inpatient	\$6,859	\$7,872+	\$6,994
Outpatient	\$1,254*	\$1,192	\$982
Physician	\$1,855	\$1,990	\$1,832
Other	\$1,253	\$2,113	\$2,865*
Mental	\$802	\$898	\$755
Non-Mental	\$10,418	\$12,270	\$11,740
Total	\$11,220	\$13,168*	\$12,495

* Differences significant at $p \leq .05$

Table 4-11: Healthcare costs by services in age category, 1991 - 1993 Cont.

Services	Age		
	65-70	71-80	81+
African American Elderly			
Inpatient	\$6,618	\$10,033	\$9,283
Outpatient	\$1,251	\$1,048	\$1,034
Physician	\$1,958	\$2,066	\$2,272
Other	\$1,864	\$2,693	\$2,648
Mental	\$1,317	\$1,196	\$955
Non-Mental	\$10,366	\$14,637+	\$14,282
Total	\$11,683	\$15,833	\$15,237

* Differences significant at $p \leq .05$; + Significant difference at $p < .10$

emerged. African Americans tended to have higher healthcare costs in two age groups as compared to whites. For instance, in the mid-old group, African Americans had higher healthcare costs than whites (\$15,833 vs. \$13,168 respectively) and similarly in the old-old category, cost of healthcare was also higher for African Americans than whites (\$15,237 vs. \$12,495 respectively).

Summary and Discussions of Age

Our analyses clearly indicate that both prevalence of any psychiatric disorder and specific disorders are age-related. Further, the very old (80+ years) elderly are more likely to manifest symptoms of dementia and organic psychosis while the young-olds are more likely to suffer from depression and anxiety. Since previous research has established that dementia and Alzheimer are more prevalent among the older elderly (aged 80 plus), our findings are supportive of findings reported by others for this age category (see Gallo & Lebowitz, 1999).

Additionally, we found no racial differences in the prevalence of specific diagnoses with regard to age categories; the proportion of elderly within each age category did not differ significantly in specific psychiatric diagnoses by race. However, there were significant differences in healthcare costs by race within each age category. In at least two age categories, costs were higher for African Americans as compared to their white peers.

The higher healthcare costs among African Americans may result from a number of factors including: (i) the perception that that initial problems were not severe enough to seek medical services; (ii) appointments for services were difficult to obtain. Consequently, services were obtained only when medical conditions become worse and

expensive to treat. Surveys of ambulatory services indicate that African Americans use emergency room services at higher rates than whites (McCaig, 1994a, 1994b; Craig, 1991; Bazargan et al., 1998), and when hospitalized, African Americans show more severe symptoms of illness (Buckle et al., 1992). Further, African Americans have longer length of hospital stay (Johnson et al., 1990) and higher hospital mortality rates than whites (Edmonds, 1990). It appears that all these factors could possibly contribute toward the higher healthcare costs of African American Medicare beneficiaries in this study.

Chapter 5

Social Class, Mental Illness and Service Utilization

Social Class and Mental Illness

During the last six decades, numerous studies have focused on the relationship between social class and mental illness. Generally, the studies have reported higher rates of psychopathology in lower socio-economic status (SES) or more severe diagnoses associated with lower classes than higher classes. For instance, Faris and Dunham (1939) reported that rates of first admissions to mental hospital varied systematically with the economic and social characteristics of census tracts that patients had inhabited before admission. They examined major diagnoses such as schizophrenia, manic-depressives, drug addiction, alcohol psychosis, and old-age psychosis. They found that rates of psychosis and schizophrenia were higher for inner city census tracts (hence lower SES) and these rates decreased as one moved away from the inner city toward the suburban areas (the later being higher SES). Findings from Baltimore reported an inverse relationship between higher rates of psychoses and lower family income (Lemkau Tietze, & Cooper, 1942). Hollingshead and Redlich (1958) and others have reported similar inverse relationship between high rates and lower social class. In a review of 20 studies, Neugebauer, Dohrenwend and Dohrenwend (1980) found that 17 of these studies showed higher rates of psychopathology in lower SES with an average ratio of 2.59 between the lowest and highest classes. According to Dohrenwend and Dohrenwend (1969), the social class - psychopathology relationship is the most substantiated finding in psychiatric epidemiology.

Recently, the social class-psychopathology relationship was re-examined by Holzer, Shea et al., (1986) in the NIMH's Epidemiologic Catchment Area studies (ECA) data. Their analyses confirmed the overall inverse relationship; higher rates of any disorder were found in lower classes as compared to higher classes (an estimated risk of 7.9 in lowest SES relative to the highest SES group), and that specific disorders varied by social class. For instance, rates of cognitive impairment, schizophrenia, alcohol abuse or dependence, and depression were all higher in lower SES than higher SES (Holzer, Shea et al., 1986).

Creating an Index of Social Class: Data Analysis

For this study, we linked data from the U.S. Census on per capita household incomes and levels of educational attainment according to ZIP Code, with Medicare reimbursement administrative data on individual enrollees in the Tennessee Medicare program. As per Gornick et al. (1996), this approach is based on studies validating the use of aggregate census information on socioeconomic status as a proxy for the socioeconomic status of individuals, with the caveat that aggregate data reflect both individual characteristics and population characteristics of the individual's place of residence.

Moreover, we used income and educational data from the 1990 U.S. Census as proxy measures. Per capita income of persons 65 and older were calculated separately for whites and African Americans, according to postal ZIP code of residence. We then assigned a proxy income to each beneficiary that corresponded to the per capita income for his or her race and ZIP Code. For education, we calculated the percentage of persons with at least high school for each race by ZIP code. We then assigned a proxy education to each beneficiary.

Linkage of Medicare Data and Census Data

A five percent random sample of Tennessee Medicare beneficiaries who received services on at least one occasion during the years 1991, 1992, and 1993 was drawn by the United States Health Care Financing Administration (HCFA); data tapes with this information were provided to us by HCFA. Analyses were confined to beneficiaries whose race was listed as African American or white and who were at least 65 years of age. Beneficiaries in this sample were classified as to whether (i) they had no visits during the observation period for which there was a primary diagnosis of mental disorder (i.e., no mental health problem), (ii) if there was at least one visit during the three year observation period for which there was a primary diagnosis of mental disorder (1 mental health problem), or (iii) if during any one year, there were at least two primary diagnoses of different mental disorders (2+ disorders defined as mental comorbidity). For all beneficiaries, service utilization was included irrespective of whether the visit was for a primary mental health diagnosis. In all, there were 35,787 persons included in the five percent random sample, of which 33,735 met the inclusion criteria. Of those excluded, race was classified as “unknown” for 1,484 (4.1%) and as “other” for 541 (1.5%). Using the Physicians’ Reimbursement File (PRF), the study population was described in terms of demographic factors (including age, gender, racial group, and ZIP code of residence), diagnostic codes as per the Clinical Modification of the International Classification of Diseases, or ICD-9 and services utilized (Medicode, 1995). Mental health disorders were defined by the following ICD-9 codes: 290.0 - 298.9 and 300.0 - 312.9. We excluded childhood mental health diagnoses and mental retardation. The number of inpatient discharges was computed from the in-patient reimbursement file (IPR).

We were able to classify 32,727 of 33,735 (91.4%) of Tennessee Medicare beneficiaries according to income by ZIP code of residence in the census file. The corresponding figures for educational level were 31,141 of 33,058 (94.2%). For whites, matching was 96.9% complete for income (29,204 of 30,136) and 98% for education (29,519 of 30,136). For African Americans, matching was 97.8% complete for income (3,521 of 3,599) and 98.3% complete for education (3,539 of 3,599). Match failures were due to missing information in the census file, incorrect ZIP codes, or ZIP codes for which census information was excluded from the census file for reasons of confidentiality. Beneficiaries for whom matching information was unavailable were excluded from the analyses. Using analysis of variance, however, no significant differences emerged between matched and unmatched beneficiaries with regard to race, age, gender, residence or lack of residence in a Standard Metropolitan Statistical Area (SMSA), ZIP Code and utilization of services.

For descriptive purposes, white and African American beneficiaries were separately assigned to one of four groups of approximately equal size according to per capita income level. This procedure was required because of the gross uneven distribution of African Americans in the income and education quartile when a single grouping criteria was used. White beneficiaries were distributed fairly evenly among the four income quartiles, but African American beneficiaries were quite unevenly distributed, with only 5.4% of the African American population appearing in the two upper income quartiles for the sample as a whole. Similarly, while whites were distributed quite evenly with respect to educational level, only 31% of the African Americans appeared in the two upper quartiles for the sample as a whole. Finally, 81% of African Americans resided in an SMSA, while this was only true for 61% of whites.

Income quartiles one through four among African Americans were $\leq \$5,709$ (1st quartile); $\$5,710 - \$6,587$ (2nd quartile); $\$6,588 - \$7,301$ (3rd quartile); and $\geq \$7,302$ (4th quartile). Corresponding values for whites were $\leq \$10,291$ (1st quartile); $\$10,292 - \$11,934$ (2nd quartile); $\$11,935 - \$14,195$ (3rd quartile); and $\geq \$14,196$ (4th quartile). Educational quartiles based upon percentage of high school education among African Americans were $\leq 53.2\%$ (1st quartile); $53.3 - 57.8\%$ (2nd quartile); $57.9 - 65.8\%$ (3rd quartile); and $> 65.8\%$ (4th quartile). Corresponding values for whites were $\leq 56.8\%$ (1st quartile); $56.9 - 64.1\%$ (2nd quartile); $64.2 - 75.0\%$ (third quartile); and $> 75.0\%$ (4th quartile).

Finally, SES was computed by adding the income percentile to the education percentile. In those cases where both income and education were available the sum was divided by 2. Where income alone was available the SES variable equals the income variable. In the case that education alone was available the SES variable equals the education variable. Like the income and education percentiles, quartiles were computed differently by race because so few African Americans were in the top two quartiles. For African Americans, the four quartiles were $\leq 9.639\%$ (1st quartile); $9.64\% - 19.051\%$ (2nd quartile); $19.052\% - 35.009\%$ (3rd quartile); $\geq 35.01\%$ (4th quartile). Corresponding values for whites were $\leq 32.722\%$ (1st quartile); $32.723\% - 54.301\%$ (2nd quartile); $54.302\% - 76.149\%$ (3rd quartile); $\geq 76.15\%$ (4th quartile).

Social Class and Prevalence of Psychiatric Disorders

Table 5-1 presents prevalence rates of selected physical and psychiatric disorders by SES. For physical disorders, there is an inverse relationship SES and prevalence of diabetes and heart disease. The rates of diagnosis for the lowest quartile, as compared to upper quartiles, were significantly higher for diabetes (171.1 vs. 134.4 per thousand from lowest to highest quartile respectively) and heart disease (440.9 vs. 403.1 per thousand from lowest to highest quartile respectively). By contrast, those in the highest SES quartile had a significantly higher rate of cancer (225.0 vs. 183.6 per thousand highest quartile to lowest quartile respectively).

Unlike the pattern of inverse relationships reported by previous studies, we did not find a consistent relationship between prevalence of mental disorder and social status as measured by combining income and education levels. While dementia and organic psychosis were more prevalent in the 1st and 2nd quartiles, mood (includes depression)

and schizophrenia were highest in the 4th SES quartile. None of these rates were significantly different. Only one rate of mental disorder was significantly higher for any quartile. The 2nd quartile shows a significantly higher rate of anxiety disorder (62.5 per thousand), followed closely by the 1st quartile (59.4 per thousand), with the 4th quartile showing the lowest rate (46.8 per thousand).

**Table 5-1: Prevalence of psychiatric disorders by SES quartiles
per 1,000, 1991-1993**

Disorder	Lowest Quartile	2nd Quartile	3rd Quartile	Highest Quartile	Total
	(n=8,278)	(n=8,222)	(n=8,276)	(n=8,228)	(n=33,004)
Diabetes	171.1*	170.4	156.6	134.4	158.1
Heart Disease	440.9*	428.5	407.3	403.1	420.0
Hypertension	411.6	407.0	410.8	399.0	407.1
Stroke	152.6	147.2	143.9	138.8	145.6
Arthritis	494.7	490.0	485.9	473.9	473.9
Cancer	183.6	192.8	210.7	225.0*	203.0
Dementia	40.2	38.9	38.8	43.3	40.3
Organic Psychosis	27.5	31.3	26.8	29.4	28.8
Schizophrenia	30.0	32.8	29.4	33.3	31.4
Mood Disorder	35.3	40.3	39.5	39.4	38.6
Anxiety Disorder	59.4	62.5*	56.3	46.8	56.3
Any Mental Disorder	157.4	166.6	153.7	153.7	157.9
Co Morbid	38.7	39.9	40.4	38.6	39.4

* Differences significant at $p \leq .05$

Analyses of rates by race show that an inverse relationship exists in the overall rate of diabetes, heart disease, stroke, and arthritis and these rates were significantly higher for whites in the 1st quartile (see table 5-2). Among African Americans, however, only hypertension showed any significant inverse relationship (see table 5-3). Like the overall analysis, rates of cancer among whites are significantly higher for the 4th quartile (234.2 vs. 193.0 per thousand from the 4th quartile to 1st quartile respectively). Similarly, the rate of cancer among African Americans is significantly higher for the 4th quartile (147.9 vs. 106.9 from 4th quartile to 1st quartile respectively).

Table 5-2: Prevalence of psychiatric disorders by SES quartiles for whites per 1,000, 1991-1993

Disorder	Lowest Quartile	2nd Quartile	3rd Quartile	Highest Quartile	Total
	(n=7,380)	(n=7,328)	(n=7,408)	(n=7,349)	(n=29,465)
Diabetes	164.9*	162.0	147.9	124.6	124.6
Heart Disease	445.0*	432.0	407.3	405.4	422.4
Hypertension	393.0	391.6	393.9	386.4	391.2
Stroke	152.3*	145.9	143.1	135.7	144.2
Arthritis	502.2*	489.1	485.0	476.5	488.1
Cancer	193.0	202.4	219.9	234.2*	212.4

Dementia	38.8	37.7	38.6	41.5	39.1
Organic Psychosis	26.4	30.4	26.2	27.1	27.5
Schizophrenia	28.9	33.8	28.2	32.5	30.9
Mood Disorder	36.0	42.0	41.2	42.5	40.4
Anxiety Disorder	62.9	64.5*	58.0	49.5	58.7
Any Mental Disorder	158.7	169.8*	154.2	152.9	158.9
Co Morbid	38.5	40.1	41.2	39.5	39.8

* Differences significant at $p \leq .05$

With the exception of anxiety disorder, there were no significant differences in rates of any mental disorder for whites or African Americans. The 2nd quartile in both the white and African American samples reveals a significantly higher rate of anxiety disorder. Nevertheless, there is no significant difference between SES quartiles for total mental disorder, dementia, organic psychosis, schizophrenia, or mood disorder. It may be added that the rate of mental comorbidity (multiple diagnoses assigned to one individual during the same year) was equally spread among all four SES groups across both racial groups (see Table 5-2).

Our findings, though in the expected direction, were not indicative of strong relationships as reported by previous studies. The weaker relationship in the present study may result from the indices of social class that were developed in this study. Since we did not have direct measures of the beneficiary's education and income, we imputed their values from the census available for the Zip codes. Hence, these imputed values (which were used in developing quartiles for both education and income and combined to create SES) have affected the SES-mental disorder relationship. Among physical

disorders, where the incidence rates were larger, the inverse relationship between physical disorders was evident, with the exception of cancer.

Table 5-3: Prevalence of psychiatric disorders by SES quartiles for African Americans per 1,000, 1991-1993

Disorder	Lowest Quartile	2nd Quartile	3rd Quartile	Highest Quartile	Total
	(n=898)	(n=894)	(n=868)	(n=879)	(n=3,539)
Diabetes	221.6	239.4	230.4	216.2	226.9
Heart Disease	407.6	399.3	407.8	384.50	399.8
Hypertension	564.6*	532.4	555.3	504.0	539.1
Stroke	154.8	157.7	150.9	165.0	157.1
Arthritis	432.0	497.8*	494.2	451.8	468.5
Cancer	106.9	114.1	132.5	147.9*	125.2

Dementia	52.3	49.2	40.3	58.0	50.0
Organic Psychosis	36.7	38.0	32.3	48.9	39.0
Schizophrenia	39.0	24.6	39.2	39.8	35.6
Mood Disorder	29.0	25.7	25.3	13.7	23.5
Anxiety Disorder	31.2	45.9*	41.5	23.9	23.9
Any Mental Disorder	147.0	140.9	149.8	160.4	149.5
Co Morbid	40.1	38.0	33.4	31.9	31.9

* Differences significant at $p \leq .05$

Social Class, Race, and Service Utilization

Although the prevalence of mental illness is estimated to be as high as 24% in the United States (Robins et al., 1984; Robins & Regier, 1991; Bourdon et al, 1992; Kessler et al., 1994; 1996), mental health services appear to be underutilized (Kessler et al., 1994; 1996). This is particularly so among minority and elderly populations (Husaini, Moore, & Linn, 1990; Padgett et al., 1994; Neighbors et al., 1992; Hough et al., 1987; Sussman et al., 1987; Husaini, Moore, & Cain, 1994; Mechanic et al., 1982; Lasoki, 1986; Waxman, Carner, & Blum, 1983; Wells et al., 1988). Since elderly populations in the United States are provided Medicare insurance, these observations suggest that accessibility to and utilization of services are not equivalent (Gormick et al., 1996).

In order to explore further the relationships between accessibility and utilization within population subgroups, it is often suggested that race be used as a partial surrogate

for socioeconomic status; usually, this is because information on more appropriate descriptors, such as income and education, is unavailable (Gornick et al., 1996). When income has been included, racial differences in service utilization have been reduced, but not eliminated (Gornick et al., 1996). Income itself, however, may be a surrogate for other factors. For example, persons with lower income may have greater levels of illness or different levels of education (MacMahon & Pugh, 1970). They may experience differences in the availability of services (Ordin & Levin, 1986), have different personal preferences or experience different types of treatment, or have different levels of insurance availability (Gornick et al., 1996; Blustein, 1995). It is therefore reasonable to seek further understanding of service utilization patterns by expanding the linkage between Medicare administrative data and demographic information from other sources.

Utilization rates were examined in terms of (i) the number of hospital discharges per 1,000 person-years, and (ii) the number of physician visits per person-year. One person-year was credited for each year the beneficiary was shown to have received benefits during 1991, 1992, and 1993. ANOVAs and t-tests were used to analyze mean physician visits, hospital discharge rates, hospital days, and trends. Multiple regression analyses were performed with utilization as the outcome variables and individual values for age, gender, educational level, per capita income, residence within or without a Standard Metropolitan Statistical Area (SMSA) and mental comorbidity as the independent variables. The distributions of age, gender, income, education, and residence in an SMSA among African American and white beneficiaries are shown in Table 5-4. The mean age of African American females was 76.3 years while that of white females was 75.5 years; corresponding values for males were 75.3 and 73.9 years.

Table 5-4: Age, gender, per capita income, education and residence within or outside a SMSA among medicare beneficiaries, 1991-1993

	Male	Female	Total
Age (years)			
African Americans	75.3 (n=1,338)	76.3 (n=2,261)	75.9 (n=3,599)
Whites	73.9 (n=11,886)	75.5 (n=18,250)	74.9 (n=30,136)
Per Capita Income			
African American Quartiles	Number of African Americans	White Quartiles	Number of Whites
≤ \$5,709	930	≤ \$10,291	7,308
\$5,710 - \$6,587	830	\$10,292 - \$11,934	7,371
\$6,588 - \$7,301	883	\$11,935 - \$14,195	7,279
≥ \$7,302	878	≥ \$14,196	7,246

Table 5-4: Age, gender, per capita income, education and residence within or outside a SMSA among medicare beneficiaries, 1991-1993, cont.

Education (Percent with HS Diploma or more)

African American Quartiles	Number of African Americans	White Quartiles	Number of Whites
≤ 53.2%	930	≤ 56.8%	7,308
53.3% - 57.8%	830	56.9% - 64.1%	7,371
57.9% - 65.8%	883	64.2% - 75.0%	7,279
≥ 65.9%	878	≥ 75.1%	7,246

Residence

	Number of African Americans	Number of Whites
Outside SMSA	670	11,907
Inside SMSA	2,929	18,229

In this report, we expand previous inquiries linking socio-economic information with clinical data from Medicare claims. Specifically, in addition to race and income, we include education and residence within or outside a Standard Metropolitan Statistical Area (SMSA) as part of a multifactorial model on healthcare utilization among Tennessee Medicare beneficiaries during the years 1991, 1992, and 1993.

Figure 5-1 shows the crude rates of utilization for physician visits by SES quartiles. Whites have significantly more visits to physicians than do African Americans (15.2 for whites and 14.2 for African Americans). The service utilization of physicians for whites shows significant differences by SES quartile. The higher the SES, the more physician visits (15.8 vs. 14.8 from highest quartile to lowest quartile respectively). Among African Americans, however the pattern is more complicated. Like the mean number of physician visits for whites, the number of physician visits rises from the 1st to the 3rd quartile. Unlike whites, however, for African Americans the number of physician visits drops for the 4th quartile. For African Americans, there is no significant difference in the mean number of physician visits by SES quartile.

Figure 5-1: Physician visits by SES quartiles by race, 1991-1993

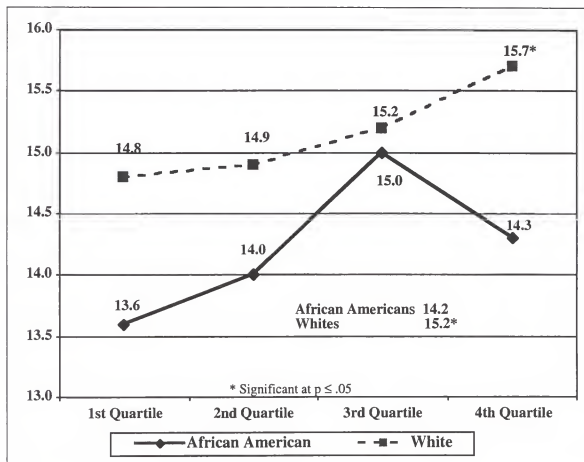
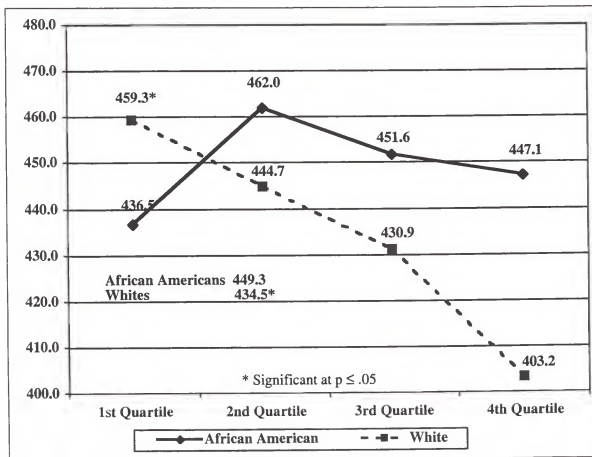


Figure 5-2 shows the crude rates of hospital discharges per 1,000 beneficiaries by SES. Whites have significantly fewer hospital discharges than African Americans do (434.8 vs. 456.7 per thousand respectively). Whites and African Americans show different service utilization patterns in hospital discharge rates. The hospital discharge rate for whites drops significantly as SES level rises. This is the inverse of the pattern for physician visits by whites. African Americans, by contrast, show a rise in the hospital discharge rate from the 1st to the 2nd SES quartile. From the 2nd quartile to the 4th quartile the hospital discharge rate drops, but not as quickly as that among whites. Overall discharge rates for African Americans are significantly higher than whites (449.3 vs. 434.5 per thousand respectively). Nevertheless, the rate of hospital discharges for whites in the lowest quartile is actually higher than the rate for African Americans (459.3 vs. 436.5 respectively).

Figure 5-2: Hospital discharges per 1,000 person years by SES and race, 1991-1993



In contrast to the number of physician visits and the rate of hospital discharges, there were no significant difference in the number of days hospitalized by SES quartile (see Table 5-5). Both whites and African Americans show similar patterns of flat service utilization from the lowest to the highest quartiles. Since the rate of hospital discharges among whites is significantly higher among those in the 1st quartile of SES, it is interesting that the number of days is so similar. Obviously the number of days per hospital stay is greater for those in the highest quartile in comparison to the lowest. Among African Americans the picture is more complicated by the low hospital discharge rate for those in the lowest quartile; nevertheless, the same pattern as that of whites is evident in the top three quartiles.

Table 5-5: Mean number of inpatient days by SES quartiles by race per 1,000, 1991-1993

Race	Lowest Quartile	2nd Quartile	3rd Quartile	Highest Quartile	Total
	(n=7,380)	(n=7,328)	(n=7,408)	(n=7,349)	(n=29,465)
Whites	3.3	3.3	3.3	3.2	3.3
	(n=898)	(n=894)	(n=868)	(n=879)	(n=3,539)
African Americans	4.6	4.7	4.3	4.3	4.5

* Differences significant at $p \leq .05$

Social Class, Race, and Health Costs

Despite the significantly higher rate of hospital discharges among whites in the lowest quartile, there were no significant differences in the cost of inpatient care by SES (see Table 5-6). Some significant differences, however, are evident among whites. The

Table 5-6: Mean healthcare costs by SES quartiles for whites per 1,000, 1991-1993

Race	Lowest Quartile	2nd Quartile	3rd Quartile	Highest Quartile	Total
	(n=7,380)	(n=7,328)	(n=7,408)	(n=7,349)	(n=29,465)
Inpatient	\$4,203	\$4,208	\$4,466	\$4,404	\$4,320
Outpatient	\$823	\$802	\$794	\$767	\$797
Physician	\$1,237	\$1,285	\$1,259	\$1,350*	\$1,283
Other	\$1,424*	\$1,117	\$876	\$783	\$1,050
Total Mental Health	\$87	\$134	\$130	\$179*	\$132
Total Non Mental	\$7,601	\$7,279	\$7,266	\$7,125	\$7,318
Total	\$7,688	\$7,413	\$7,396	\$7,304	\$7,451

* Differences significant at $p \leq .05$

physician costs is significantly higher for whites in the highest quartile (\$1,283 vs. \$1,237 highest to lowest quartile respectively). Similarly in the total mental health costs, those whites in the 4th quartile had significantly more costs than those in the 1st quartile (\$179 vs. \$87 respectively). Other costs, which include home health and skilled nursing, also showed a significant difference by SES. Those in the lowest quartile had almost twice the total cost, in comparison with those in the 4th quartile (\$1,424 vs. \$783 respectively). Total healthcare costs, however, did not differ significantly. Nevertheless, the lowest quartile had the highest total cost (\$7,688 1st quartile; \$7,413 2nd quartile; \$7,396 3rd quartile; and \$7,304 4th quartile).

Like the analysis for whites, the total healthcare cost for African Americans did not differ significantly (see Table 5-7). Unlike whites, however, it was in the third quartile that African Americans had the highest total costs (\$9,227 for 1st quartile; \$8,803 2nd quartile; \$9,492 third quartile; and \$8,591 for the 4th quartile). There were also no significant differences among African Americans for inpatient or physician costs. Outpatient costs showed a significant difference with the 3rd quartile having the highest rate and the 1st quartile the lowest (\$939 vs. \$688 respectively). Like whites, a significant difference was evident in other costs. Somewhat surprisingly, however, the highest costs for African Americans were in the 3rd quartile, as compared to a higher cost for whites in the 1st quartile. Unlike whites, African Americans showed no significant differences in the cost of mental healthcare by SES.

**Table 5-7: Mean healthcare costs by SES quartiles for African Americans
per 1,000, 1991-1993**

Race	Lowest Quartile	2nd Quartile	3rd Quartile	Highest Quartile	Total
	(n=898)	(n=894)	(n=868)	(n=879)	(n=3,539)
Inpatient	\$5,816	\$5,107	\$5,250	\$5,074	\$5,314
Outpatient	\$668	\$739	\$939*	\$917	\$814
Physician	\$1,204	\$1,339	\$1,331	\$1,289	\$1,290
Other	\$1,538	\$1,618	\$1,972*	\$1,312	\$1,608
Total Mental Health	\$136	\$200	\$144	\$240	\$180
Total Non Mental	\$9,091	\$8,602	\$9,348	\$8,351	\$8,849
Total	\$9,227	\$8,803	\$9,492	\$8,591	\$9,027

* Differences significant at $p \leq .05$

Summary and Discussions

Significant difference in the prevalence of physical disorders by SES are evident among whites though less so for African Americans. Whites show significantly higher rates of diabetes, heart disease, stroke, and arthritis for those in the 1st quartile and lowest rates in the 4th quartile. Conversely, Whites show cancer rates to be highest in the 4th quartile and lowest in the 1st quartile. African Americans show a similar pattern for cancer, but diabetes, heart disease, and stroke show no significant differences by SES.

With the exception of anxiety disorder, there were no significant differences in rates of any mental disorder for whites or African Americans. The 2nd quartile in both the white and African American samples reveals a significantly higher rate of anxiety disorder. Nevertheless, there is no significant difference between SES quartiles for total mental disorder, dementia, organic psychosis, schizophrenia, or mood disorder. It may be added that the rate of mental comorbidity (multiple diagnoses assigned to the individual during the same year) was equally spread among all four SES groups across both racial groups.

Service utilization, as shown by rates of hospital discharges and physician visits, do show significant differences by SES for whites. Rates of hospital discharges and mean physician visits show an inverse relationship. The lowest number of physician visits is among those in the 1st quartile, while the highest number is in the 4th quartile. By contrast, the rate of hospital discharges was highest in the 1st quartile and lowest in the 4th quartile. Among African Americans, the pattern was more complex. African Americans show a similar trend as compared with whites in physician visits per person for the first three quartiles but unlike whites the number of visits drops in the 4th quartile. By contrast, African Americans show a similar trend in hospital discharges for the last three quartiles, but the 1st quartile shows the lowest rate of discharges. Finally, there were no significant differences in the mean number of inpatient days by SES quartiles.

Like the other rates of service utilization, costs reveal a complex pattern. Whites in the 4th quartiles show significantly higher costs for physicians and total mental health costs with those in the 1st quartile having the lowest costs. Inversely, those in the 1st quartile have a significantly higher cost for other services (home health, skilled nursing, & hospice), with those in the 4th quartile showing the lowest cost. Total costs, however, show no significant difference by SES. Among African Americans, there is also no significant difference in the total cost of healthcare by SES. African Americans show significant differences in only two measures, outpatient charges and other charges. The highest cost in both instances is in the 3rd quartile.

Our findings, though usually in the expected direction, were not indicative of a strong relationship between SES and diagnoses and service utilization. The weaker relationship may very well be the result of the indices of social class that were used in this study. We had no direct measures of either income or education and had to impute their values from the income and education variables from the census available for zip codes. Among physical disorders, where the incidence rates were larger, the findings were stronger.

Chapter 6

Mental Comorbidity and Service Utilization

Concept of Comorbidity

The term comorbidity has been used in at least two distinct ways: (i) as mental health illnesses when combined with physical illnesses; and (ii) as co-occurrence of substance and mental health disorders. The latter approach has particularly underscored the importance of investigating the phenomena of comorbidity and its effect on the cost, quality, access, and use of healthcare services. More than twenty-five studies have focused on the issues of comorbidity as cited by Regier et al. (1990). However, while many studies have examined psychiatric comorbidity in the last two decades, none has focused on the impact of comorbidity in the Medicare elderly populations.

The difficulties associated with comorbidity are perceived as being so critical and costly that some have argued that psychiatric services need to be integrated into primary care settings (Kim & Flaherty, 1996) or that innovative systems of care need to be created specifically for comorbid individuals (Peterson, Swindle, Moos, Finney, & et al., 1992; Ridgely, Lambert, Goodman, Chichester, & Ralph, 1998). While some confusion exists as to the exact definition of comorbidity, it is clear that the care for these comorbid, no matter how they are defined, is disproportionately more costly (Levenson, Hamer, & Rossiter, 1990; Mezzich, 1991). Moving beyond the mere cost of treatment, Kessler and his colleagues found that days of work missed were more frequent for those persons with comorbid psychiatric disorders than for those with only one diagnosis or no diagnosis at all (Kessler & Frank, 1997). The disproportionate treatment costs of comorbid s has sparked intense interest in the manner in which these individuals receive care over time.

In this chapter we report on a random 5% sample of data describing health and mental healthcare of Medicare beneficiaries (65 and older) residing in Tennessee from 1991 to 1993. We first summarize previous findings relative to areas of comorbidity (as indicated above) and present our operational definition of this phenomenon. Next, we describe the diagnostic and demographic characteristics of individuals with comorbid conditions. Finally, we describe the services received and their associated costs.

Health and Mental Health Comorbidity

Lyons et al. compared patients with traumatic head and spinal cord injuries who received psychiatric services with matched controls to assess the effect of health and mental health comorbidity on hospital length of stay (LOS) and charges. Results suggested that this comorbidity increased LOS and that psychiatric intervention may reduce LOS (Lyons, Larson, Burns, Cope, & et al., 1988). Further evidence indicated that co-occurring medical and mental health conditions were much more expensive to treat (Essock-Vitale, 1987).

Substance Disorder and Mental Health Comorbidity

An immense amount of information has been gathered over the past two decades regarding the prevalence, incidence, and impact of individuals diagnosed with both substance and mental disorders (see 23 studies cited by Bourden et al., 1992). This type of comorbidity has dramatic implications for individuals in this condition, for treatment providers, and for society. Lennox and his associates (1993) reported that comorbid (i.e., alcoholic individuals with depression) responded more severely to their alcoholism, recovered more slowly, and were much more likely to relapse (Lennox, Lennox, & Bohlilg, 1993). The prognosis is poor (Evans & Connis, 1996) and the cost is also affected (Kivlahan, Heiman, Wright, Mundt, & Shupe, 1993). Dickey and her colleague (1996) compared the costs of psychiatric treatment for (i) persons with seriously mental illness and substance abuse; and (ii) mentally ill people not abusing substances. Combining various data sources, Kivlahan and associates examined the patterns of care and expenditures of 16,395 psychiatrically disabled Medicaid beneficiaries (aged 18-64 years). They found that the cost of care for those with mental health/substance abuse comorbidity was almost 60% higher than those of non-abusers. Most of the cost difference was the result of more acute psychiatric inpatient treatment (Dickey & Azeni, 1996). Goodman and his associates (1992) found similar results including the increased risk of inpatient treatment when comorbid mental health and substance disorders were present (Goodman, Holder, Nishiura, & Hankin, 1992). Further, evidence linking the co-occurrence of alcohol abuse and depression and anxiety has been reported (Swendsen et al., 1998).

Mental Comorbidity among Medicare Elderly

For this study, we operationally defined mental comorbid all individuals who were assigned more than one mental health diagnosis within a year. Mental health diagnoses include both substance disorders (e.g., alcohol abuse or drug dependence) and organic brain disorders (e.g., dementia or Alzheimer's); this category of comorbidity has been used by others (Blazer, Kessler, McGonagle, & Swartz, 1994; Kessler, McGonagle, Zhao, Nelson, & et al., 1994; Kessler et al., 1998).

Category of Comorbid Conditions

The comorbid classification for this study used psychiatric diagnoses based upon the International Classification of Diseases, or IC-9 codes (codes 290.0 through 298.9 and 300.0 through 312.9). This definition was chosen to capture comorbidity in its broadest terms while still maintaining a focus on mental health issues. For the remainder of this chapter, only those with a psychiatric diagnosis from the 5% random sample are discussed. Hereafter, we shall refer to mental comorbidity as multiple mental health diagnoses (MMD), which we believe is more accurate and clear.

Using our definition, we found that over a period of three years, one quarter (25%) of those with a psychiatric diagnosis during the same year had multiple diagnoses and they could be classified as being mental comorbid. This prevalence of comorbidity is very similar to what Bourdon et al. (1992) have reported from the ECA data. The

proportion of Medicare elderly with at least one psychiatric diagnosis was approximately 15.9%. On the average, comorbids were older than those with a single diagnosis (78 vs. 77 years respectively).

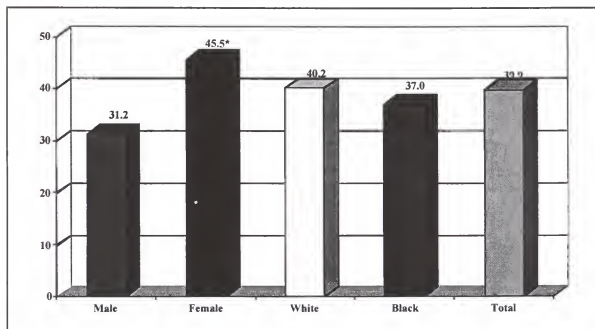
Additional analyses indicated that among those with a mental disorder, the most prevalent comorbidity included combinations of multiple diagnoses such as dementia with organic psychosis (49%), dementia with schizophrenia (51%), organic psychosis with schizophrenia (44%), schizophrenia with mood disorders (52%), and mood with anxiety disorders (58%). These data indicate that nearly half of those classified as having dementia were also diagnosed later that year as having either organic psychosis or schizophrenia. Similarly, more than one-half of those classified as having mood (depression) disorders were later on also diagnosed with anxiety and phobia during the same year.

These five categories of comorbidity differed significantly in age in that those classified with dementia and organic psychosis were the oldest (83 years), followed by dementia with schizophrenia (81 years), organic psychosis with schizophrenia (80 years), schizophrenia with mood disorder (77 years), and mood disorder with anxiety (74 years). We did not find a noticeable percentage of comorbid elderly with a diagnosis of substance abuse and other psychiatric diagnosis in this Medicare population.

Comorbidity by Gender and Race

Figure 6-1 presents the rate per thousand of MMD by gender and race. Since females constitute a higher percentage of the elderly population and are more likely to

Figure 6-1: Gender and ethnic comparisons by multiple mental diagnoses, 1991-93

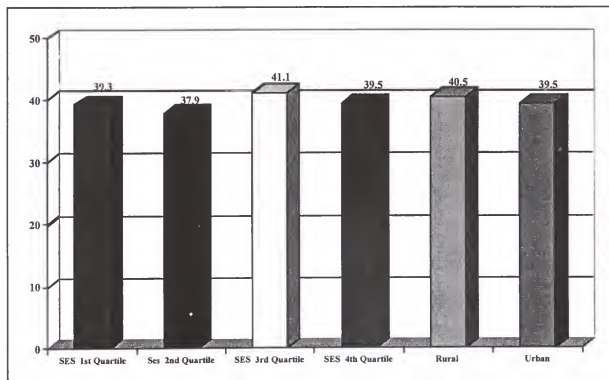


seek out mental health services (Blazer et al., 1994), they should be over-represented in any study population including comorbid; this pattern is confirmed by the Medicare data. Females are significantly more likely to be diagnosed as comorbid than males (45.5 per thousand vs. 31.2 per thousand respectively). By contrast, the prevalence of MMD (comorbidity) was unrelated to race (40.2 per thousand vs. 37.0 per thousand among whites and African Americans respectively).

Comorbidity by SES and Rurality

Figure 6-2 depicts the quartile distribution of socioeconomic status (SES based on income and education) by MMD status. It was important to test whether MMD status correlated with indicators of SES or the degree to which their residential areas could be considered as rural or urban. It may have been the case that beneficiaries in lower SES or rural areas would have higher rates of MMD; however, this was not the case. Briefly, comorbidity rates did not significantly vary either by social class (SES) or by place of residence (rural vs. urban) of the elderly beneficiaries.

**Figure 6-2: SES and rural/urban comparisons
by multiple mental diagnoses, 1991-1993**

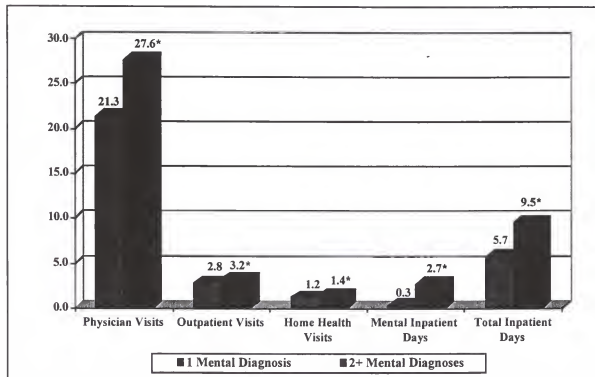


Comorbidity and Service Utilization

The next step in the examination of individuals with MMD was to test whether they differed from those with a single diagnosis with regard to the psychiatric care they

received. We examined the volume of services used by comorbid elderly. As shown in Figure 6-3, in all service categories, beneficiaries with MMD used services at a higher rate than their single diagnosis counterparts. The most dramatic difference was the use of inpatient services. Sixty-three percent (63%) of those with MMD had used inpatient services as compared to only 44% of those with a single diagnosis. This finding of higher use of inpatient services by MMD is similar to that reported by Dickey and Azeni (1996).

Figure 6-3: Volume of services used by comorbid, 1991 - 1993



Comorbidity and Healthcare Costs

Having examined the types of services used by comorbid, we now turn to healthcare costs relative to MMD. While resources spent in each service category were significantly higher for those with MMD, inpatient services were the most discrepant. Those beneficiaries with a single psychiatric diagnosis consumed an average of \$6,700 in inpatient resources while those with MMD consumed an average of \$9,664. As found for those with MMD in non-elderly individuals (Levenson et al., 1990; Mezzich, 1991), a disproportionate amount of resources were also spent on outpatient services caring for those with MMD.

**Table 6-1: Average healthcare cost by service category and comorbidity,
1991-1993**

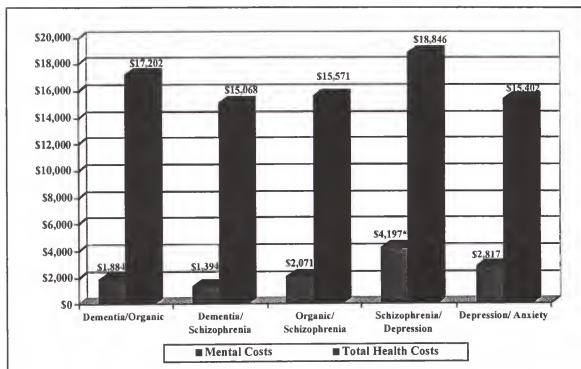
Costs	1 Mental Disorder	2+ Mental Disorders
	(n=3,996)	(n=1,343)
Other costs	\$1,986	\$2,535*
Physician cost	\$1,760	\$2,413*
Outpatient cost	\$1,089	1,261*
Inpatient cost	\$6,745	\$9,664*
Mental Cost	\$350	\$2,356*
Non-Mental Cost	\$11,229	\$13,516*
Total Health Cost	\$11,579	\$15,872*

* Significant at $p < .05$

As seen in Table 6-1, the total mental healthcare cost for those with MMD is significantly higher than those with one mental disorder, an average of over \$2,000 per year in overall psychiatric care (\$2,356 vs. \$350 respectively). Beneficiaries with single diagnosis outnumbered those with MMD by approximately threefold in this study. However, the total average amount of money spent on those with MMD compared to those with a single diagnosis was 1.37 times higher (\$15,872 vs. \$11,579). Briefly, those with MMD had a significantly higher average cost within every service category during the three-year period.

Finally, we examined healthcare cost for five categories of comorbidity. The overall health cost ranged from \$15,068 for those with dementia and schizophrenia to \$15,402 for depression and anxiety, to \$17,207 for dementia with organic psychosis, and \$18,846 for schizophrenia with depression. The overall cost differences among these categories were not significant. However, mental health costs were significantly higher for those with the diagnoses of both schizophrenia and depression (\$4197), followed by \$2,817 for depression with anxiety, \$2,071 for organic psychosis with schizophrenia, \$1,884 for dementia with organic psychosis, and \$1,394 for dementia with schizophrenia (see Figure 6-4). The proportion of the mental health costs to overall healthcare costs ranged from 9% (for dementia with schizophrenia) to 22% (for schizophrenia with mood comorbidities). The overall proportion of mental health costs is very similar to those reported by Temkin-Greener & Clark (1988).

Figure 6-4: Average healthcare cost by five categories for comorbidity, 1991-1993



Discussion and Conclusion

These data provide evidence that the sub-sample of individuals with multiple mental health diagnoses are more likely to use services and, once utilizing services, that they are more likely to consume a greater volume of services. Approximately half of the patients diagnosed with dementia were also classified as having schizophrenia or organic psychosis. Similarly, half of those with mood disorders were also reported as having anxiety and phobias. The effect of comorbidity (MMD) did not differ by race, gender, or SES. Those with MMD were significantly and consistently more expensive to treat. The mental health cost of the elderly with MMD was 15% of their total healthcare costs as compared to 3% for those with a single diagnosis. The lower mental health costs of those with a single diagnosis suggest that specialty services are not adequately available, or perhaps specialty services are being over used by the comorbid (see Regier et al., 1993; Bourdon et al., 1992). The lower cost of mental health services among those with a single diagnosis may also reflect lower service utilization due to factors such as stigma, cultural mores, financial and/or transportation barriers (Greene, 1996; Wells et al., 1988). It is evident that both the higher healthcare costs and higher rates of service utilization among the elderly with multiple mental problems are consistent with those reported by others for the non-comorbid population, particularly for the Medicare population (see Ettner & Hermann, 1997; Simon et al., 1995; Hux et al., 1998).

We found that the inpatient cost was high for comorbid and accounted for 60% of the total healthcare expenditure. The fact that comorbid were older and had higher inpatient costs suggest that they are a sicker sub-group in the Medicare population. Given these increased costs, one might speculate that close monitoring of these comorbid individuals is imperative. The focus of future research might well be on early detection and simultaneous treatment of all diagnostic symptomatology, rather than treating one diagnostic cluster at a time. Research is needed to determine whether such an approach would lead to reduced costs.

The results of this study indicate that healthcare costs of Medicare beneficiaries with multiple psychiatric diagnoses (during the same year) are higher than those with only one diagnosis. Further, certain categories of comorbidity are more expensive to treat than others. Categories such as schizophrenia, organic psychosis, and dementia are more expensive to treat than are mood and anxiety disorders. Since comorbid in this population tended to be older than their non-mental peers, it is quite possible that the higher prevalence of dementia and organic psychosis may reflect the effect of aging on illness itself. In summary, this sub-group of comorbid elderly appears to be older and sicker than their peers with a single diagnosis.

Implications for Policy

The results suggest that in this elderly population, healthcare costs significantly increase when multiple psychiatric illnesses afflict individuals. From a policy and practice standpoint, an understanding of why this is so might suggest ways to reduce costs. One such approach may involve examining the onset of multiple psychiatric illnesses so as to develop preventive interventions aimed at reducing healthcare cost among the comorbid elderly.

Chapter 7

Dementia Comorbid Conditions and Healthcare Costs

Introduction

The prevalence of dementia among the American elderly has been variously estimated to be 10% to 20% among those below 85 years old, and up to 45% among those who are over 85 years old (Gallo & Labowitz, 1999; Hendrie, 1998; Perkins et al., 1997). Canadian studies report similar results, dementia is prevalent between 10.3% and 15.3% under the age of 85 and 33.4% among males over 85 (Rockwood & Stadnyk, 1994). A study in England has also reported 10.5% dementia among the elderly who were 75 years of age and older (O'Connor et al., 1989). While estimates of 7.1% to 13.6% in Denmark (Andersen et al., 1997; Lauritzen & Korner, 1996) are similar to those observed for North American and English elderly populations, those in Sweden and Germany, have been slightly higher. In Sweden, the frequency is reported to be between 28% and 33% (Forsell & Winblad, 1998; Sandberg et al., 1998) and in Germany, it is 23.5% (Schroder et al., 1998). These variations may reflect, in part, differences in methodology and diagnostic criteria used in estimating the prevalence of dementia.

Demographic factors such as gender, education, and race have also been studied. Observations pertaining to the effects of race on the occurrence of dementia are inconsistent. While race and dementia were unrelated in one study (Fillenbaum et al., 1998), five other studies reported higher frequencies among non-whites (Folstein et al., 1991; Gurland et al., 1999; Heyman et al., 1991; Perkins et al., 1997; Shadlen et al., 1999). In the Heyman study, 16% of African American and 3.1% of white elderly had dementia. Further, combined effects of race and gender have also been reported. For example, in Perkins' study of patients over 80 years of age, Hispanic and African American males had higher rates (39% and 28% respectively) than white males (14%). It has been suggested that disproportionately high frequencies of dementia among African Americans may be due, in part, to higher prevalence of both hypertension and stroke among the African American elderly population (Heyman et al., 1991; Guo et al., 1999).

There is also evidence that females have higher rates of dementia than males (Seshadri et al., 1997), particularly Alzheimer dementia (AD; see Gao et al., 1998) while males have higher rates of Multi-infarct dementia (MID; see Folstein et al., 1991). Moreover, studies have reported that the rates of AD and MID are higher among the elderly with lower education than higher education. (Folstein et al., 1991; Evans et al., 1997). If so, memory decline may be faster and its onset earlier among less educated elderly (Schmand et al., 1997).

A few studies have examined the relationship between dementia and the presence of other psychiatric conditions e.g. for depression and dementia, (see Alexopoulos et al., 1993; Yaffe et al., 1999; Meyers et al., 1998). Additionally, dementia with depression has

been found to be higher among homebound elders referred for psychiatric services while dementia alone was higher among inpatients admitted to a geriatric psychiatry unit (Pasternak et al., 1998). Further, while dementia has been related to psychosis among African Americans, whites with dementia were more likely to have been depressed, (Cohen & Magai, 1999; Cohen, Hyland, Magai, 1998).

Finally, comorbidity of dementia with depression varies from 5% in UK (O'Connor et al., 1990) to 9% in Germany (Monking & Hornung, 1998), to 10.8% and 11.8% in the US (see Greenwald et al., 1989; Forsell & Winblad, 1998), to 28.2% in Spain (Vilalta et al., 1998). Apparently, depression as a concomitant condition exists among the demented elderly regardless of their geographic residence.

In order to address these issues among the Medicare population in Tennessee, this study addresses the following: (i) How prevalent is dementia and what are its correlates? (ii) How do demented and non-demented elderly differ on service utilization and healthcare costs? (iii) Among the dementia patients, do healthcare costs vary by the comorbidity?

Reimbursement files of 33,688 beneficiaries were used to determine the diagnosis of dementia (ICD-9 code of 290). First, according to the ICD-9 codes of mental disorders, 15.8% of beneficiaries were diagnosed as having psychiatric disorders (codes of 290 to 316 excluding mental retardation), and second, among those with a psychiatric diagnosis, 1,366 beneficiaries had a diagnosis of dementia. The results presented below are based only on those who were diagnosed with at least one psychiatric disorder (n=5,339).

Prevalence of Dementia

Our data in Table 7-1 show that more than one-fourth of those with a psychiatric diagnosis were diagnosed as having dementia (25.6%). Dementia was unrelated to education, income, or social class. However, patients with dementia tended to be older than those classified as non-demented (82 vs. 75 years). Moreover, dementia rate was higher among those who were over 80 years old than those who were between 65-70 years old (44% vs. 7% respectively). Further, more females than males (26.6% vs. 23.5% respectively), and more African Americans than whites (33% vs. 25% respectively) were diagnosed with dementia. The occurrence of dementia did not vary by place of residence, that is, whether the elderly lived in a rural or an urban community (24.3% vs. 26.3% respectively). Finally, dementia was higher among the elderly who had suffered a stroke than those who had not (34% vs. 22% respectively). The findings relative to race, age, and sex are similar to those reported by other studies.

Table 7-1: Prevalence of dementia among the medicare elderly with a mental disorder, 1991-1993

Demographic	Percentage
Ethnicity	
Whites	24.7%
Blacks	33.1%*
SES	
Low	27.1%
Medium Low	23.1%
Medium High	25.4%
High	27.1%
Residence	
Rural	24.3%
Urban	26.3%

Demographic	Percentage
Gender	
Males	23.5%
Females	26.4%*
Age	
65-70	7.4%
71-80	21.5%
81+	43.7%*
Presence of stroke	
No Stroke	22.0%
Stroke	34.0%*

* Significant at $p \leq .05$

Diagnosis of Dementia and Physicians' Specialty

We examined the specialty of physicians who provided patients with the diagnosis of dementia. Table 7-2 shows that one-third (33%) of dementia diagnoses were given by family physicians, another 31% by psychiatrists, 27% by internal medicine specialists, about 9% by multiple specialists, and almost 38% by other specialists. What is noteworthy is the fact that none of the patients were diagnosed for dementia by a neurologist. The absence of a neurologist's involvement in the diagnostic work suggests that either Tennessee experienced a shortage of neurologists to see Medicare patients, or that primary care physicians did not refer patients to neurologists for diagnosis. Since many of these dementia patients had other psychiatric comorbidity, referrals to psychiatrists in this case may have been considered adequate.

Table 7-2: Diagnosis of dementia by physicians' specialty, 1991-1993

Specialty	Percentage
Family Physician	33.0%
Psychiatrist	30.6%
Internal Medicine	26.9%

Specialty	Percentage
Multiple Specialty	8.9%
Surgery Center	3.9%
Clinic	3.6%
Misc Specialty	37.6%

Volume of Service Utilization

Beneficiaries with dementia (n= 1,366) and without dementia (n=3,993) were compared for ambulatory care as well as inpatient services. Table 7-3 indicates that the elderly with dementia relative to those without dementia had significantly more hospitalization days (an average of 8.5 vs. 6.0 days respectively), more non-mental health hospitalization days (7.1 vs. 5.3 days), slightly more outpatient visits (3.1 vs. 2.9 respectively), more visits to their physicians (24.2 visits vs. 22.3 visits), and higher utilization of emergency room services (69.7% vs. 53.1% respectively).

Table 7-3: Average volume of services used by medicare elderly with mental disorders, 1991-1993

Services	Dementia Elderly n=1366	Non-Dementia Elderly n=3,973
Inpatient Days	8.5*	6.0
Non Mental Inpatient Days	7.1*	5.3
Physician Visits	24.4*	22.3
Outpatient Visits	3.1*	2.9
% Using ER Services	69.7%*	53.1%

* Significant at $p \leq .05$

Healthcare Cost by Dementia

Table 7-4 provides average healthcare costs for inpatient and other services provided to the elderly with and without dementia. Except for the cost of out-patient services, healthcare costs for demented elderly were significantly higher than the costs for non-dementia elderly for inpatient services (\$8,448 vs. \$7,147 respectively), physician services (\$2,178 vs. \$1,837 respectively), mental health services (\$1,340 vs. \$688 respectively), home health and other services (\$2,741 vs. \$1,912 respectively), only medical (non-mental) services (\$13,106 vs. \$11,357 respectively), and total healthcare services (\$14,446 vs. \$12,045 respectively). This total healthcare cost is inclusive of all services provided to the elderly.

Table 7-4: Healthcare costs of medicare elderly with mental disorders, 1991-1993

Services	Dementia N=1,366	Non-Dementia N=3,973	Total N=5,339
----------	---------------------	-------------------------	------------------

Inpatient	\$8,448*	\$7,146	\$7,479
Physician	\$2,178*	\$1,837	\$1,924
Out-Patient	\$1,078	\$1,150	\$1,132
Other	\$2,741*	\$1,912	\$2,124
Mental Health	\$1,340*	\$688	\$855
Non Mental Health	\$13,106*	\$11,357	\$11,805
Total	\$14,446*	\$12,045	\$12,659

* Significant at $p \leq .05$

Type and Cost of Dementia Comorbidity

Previous studies focusing on psychiatric comorbidity indicate that persons with comorbid mental health conditions consume a higher volume of services and thus, show higher healthcare cost as compared to those with a single psychiatric condition (Regier et al., 1990; Bourdon et al., 1992). Since some evidence points to the role of medication and depression relative to dementia, we used our data to ask: (i) what other psychiatric diagnoses were frequently associated with dementia, and (ii) which dementia comorbid condition had more healthcare cost as compared to other comorbid conditions.

Analyses showed two trends; First, the most prevalent comorbid conditions included dementia with schizophrenia (18.7%), dementia with anxiety (12.6%), dementia with organic psychosis (12.4%), and dementia with depression (7.4%). The result for depression is within the prevalence range of dementia-depression combination reported by others (see O'Connor et al., 1990; Greenwald et al., 1989; Forsell & Winblad, 1998). Second, the healthcare costs varied considerably by these four dementia comorbid conditions. For instance, those with dementia and organic psychosis had significantly higher (non-mental) medical annual healthcare costs (\$15,907) as compared to those with dementia and depression (\$14,444), or dementia with schizophrenia (\$13,921), or dementia with anxiety (\$10,248). Further, patients who had dementia with depression had significantly higher inpatient cost (\$11,956) as compared to dementia with organic psychosis (\$10,248), or dementia with schizophrenia (\$9,087). It may be added that more than fifty percent of dementia patients with depression were treated by psychiatrists which reflects both complexity of patients' problems and increased hospitalization as compared to other dementia comorbid condition. In contrast, the inpatient cost was the lowest for those who had dementia with anxiety (\$6,678). In fact, higher cost for dementia with depression also existed for mental health services, home health and other

services, and total health care services (see Table 7-5). Briefly, our analyses indicate that the elderly who had dementia and depression as a comorbid condition were the most expensive to treat, as they incurred higher cost for inpatient services, home health services, and mental services. In contrast, the elderly with dementia and organic psychosis incurred higher cost for non-mental medical services. The dementia-anxiety conditions were, comparatively, the least expensive to treat.

Table 7-5: Healthcare cost by dementia categories, 1991-1993

Services	Dementia & Organic Psychosis	Dementia & Schizophrenia	Dementia & Depression	Dementia & Anxiety
Inpatient	\$10,248	\$9,087	\$11,956*	\$6,678
Physician	\$2,668	\$2,493	\$2,577	\$1,957
Outpatient	\$1,060	\$1,262	\$1,283	\$1,067
Other Services	\$3,049	\$2,822	\$3,149*	\$2,934
Mental Health	\$1,126	\$1,742	\$4,519*	\$2,261
Non-Mental Health	\$15,907	\$13,921	\$14,444	\$10,375
Total	\$17,032	\$15,664	\$18,964*	\$12,635

* Significant at $p \leq .05$

Discussion and Conclusion

These data show that prevalence of psychiatric disorders (15.8%) among the Medicare elderly is similar to the prevalence rate of mental illness reported for the U.S. population including the elderly (Kessler et al., 1994; Husaini, 1997). Even though 25% of those receiving a psychiatric diagnosis in our study had received the diagnosis of dementia, this percentage is similar to dementia prevalence (20%) reported for another study of Medicare elderly (Newcomer et al., 1999). In our data, only 30% of patients with dementia were seen by psychiatrists and none by a neurologist. It is possible that the higher rate of dementia found in this Medicare population reflects the absence of neurologic input. However, it is difficult to delineate the diagnostic criteria used by physicians from the reimbursement files.

Our analyses also show that dementia patients on the average tended to be older than non-dementia patients. We also found that African American elderly and female elderly received a dementia diagnoses more often than their peers. This significantly higher percentage of dementia among African American and female patients may partly reflect the aging processes (resulting in severity of medical conditions) and physicians' socio-cultural biases in assigning diagnoses.

It may also be appears that the dementia diagnosis is cost driven. During 1991-93, HCFA treated dementia as a medical condition (and not a psychiatric condition) paying 80% of the dementia related cost while it paid only 50% of the cost for other psychiatric diagnoses. Hence, this higher payment schedule for dementia may have encouraged misclassification as dementia with consequent cost-inflation. Further, since the dementia patients were older than non-dementia patients, it is also possible that their higher health costs reflect both their demented condition and age related poor health and complexity of medical problems. This may have led dementia patients to need more inpatient, home healthcare, and mental health services.

Finally, in our study, while dementia with depression was the least prevalent comorbid condition (only 7.4%), it emerged as the most expensive comorbid condition to treat. A possible explanation for the high cost is that depression may exacerbate the complications of dementia among the elderly. This finding has policy implications in that physicians may need to treat depression aggressively if other conditions are to be managed effectively. Further research is warranted in this area.

Chapter 8

Rural-Urban Residence and Service Utilization

Introduction

Since the 1978 Presidential Commission report on Mental Health, service providers and researchers have increased their efforts to determine the prevalence of psychiatric disorders and availability of clinical care in rural America. As a result, numerous studies have shown that rural communities experience high rates of both physical and mental health problems and in some instances, have higher rates of psychiatric disorders as compared to rates for urban communities. Despite higher prevalence of disorders, service utilization in rural areas remain inadequate for a number of reasons such as distance to a treatment source and lack of coordination between medical and mental services (Cohen, 1972; Clayton, 1978; Gertz, Meider, & Pluckhan, 1975; Husaini, 1983; Husaini & Linn, 1985). Briefly, the following trends have emerged from the previous studies:

1. Approximately 12% to 14% of the rural population have psychiatric symptoms requiring treatment. These symptoms are higher among females, divorced, widowed, or separated persons, and those in the lower socioeconomic status. Older rural adults suffer from depression, chronic medical conditions, and psychosomatic complaints more than their urban counterparts (Schwab, Warheit, & Holzer, 1972; Husaini, Neff, & Stone, 1979; Husaini & Neff, 1982; Husaini, 1983);
2. Rural communities have higher rates of depressive symptomatology than urban communities (Mueller, 1981; Crowell et al., 1986; Blazer et al., 1985). Depression is highest among rural African Americans as compared to both rural whites and urban African Americans (Husaini, 1983; Neff & Husaini, 1987). This higher level of depression among rural African Americans is maintained regardless of family income (Linn, Husaini, Whitten-Stovall, 1990). Further, dissatisfaction with the community has a relatively greater influence on mental distress among rural African Americans than their transient stressful life events (Linn & Husaini, 1987). Other studies have also reported that rural residents have poor mental health (Mainous & Kohrs, 1995), higher stress-related disorders (Webb & Collette, 1977), higher rates of schizophrenia (in an Italian rural community, see Thornicroft et al., 1993), and higher rates of alcohol abuse and dependence (Biazer et al., 1987);
3. While some studies have found rates of psychopathology to be higher among rural than urban residents, other investigators have reported no rural-urban differences in depression, schizophrenia, somatization, and overall psychiatric morbidity (Neff, 1983; Parikh et al., 1996; Romans-Clarkson et al., 1990; Rost et al., 1998; McCreadie et al., 1997; Swartz et al., 1989; Isometsa et al., 1997; Dottl & Greenley, 1997; Rubinstein, Daughton, Rennard, 1996). However,

service utilization is also lower among rural than urban residents (Gift & Zastowny, 1990);

4. Among rural residents, chronic medical problems and prior depression tend to be significant predictors of current depression (Linn & Husaini, 1985). This relationship between medical problems, prior depression, and current depression has also been reported for urban white and African American elderly (Husaini, 1997). In addition to depression, the major diagnoses among rural residents include personality disorders, psychoneuroses, psychoses, and alcohol disorders, (Mazer, 1976). However, rural-urban residents were similar in their coping behaviors with regard to stressful life events. For instance, stress-alcohol interaction was significant among rural residents and acute life events were consistently related to depression among urban African American drinkers (Neff & Husaini, 1985; Blazer et al., 1987);
5. Finally, while some estimates are available regarding the prevalence of psychopathology and availability of services in the rural communities, comparative treatment costs for psychiatric disorders for rural and urban residents, particularly among the elderly are not readily available. Hence, it is not known whether the average healthcare costs of treating elderly persons with psychiatric diagnoses vary by the type of psychiatric disorder and place of residence.

Given these findings, in this chapter we examine two issues with regard to the elderly Medicare beneficiaries in Tennessee: (i) Do rural-urban residents differ regarding the prevalence of psychiatric disorders, and (ii) Does total healthcare cost vary by the place of residence?

Urban and Rural Counties in Tennessee

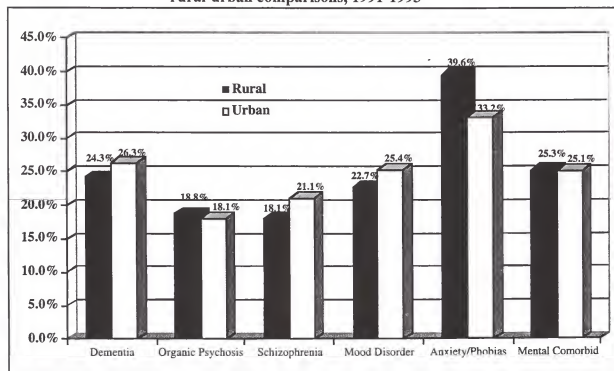
Elderly living in Metropolitan (SMSA) areas were classified as urban residents while those living in non-SMSA areas were identified as living in rural communities. According to this classification, 37% of the beneficiaries lived in rural communities while the remaining 63% lived in urban communities. A majority of both whites (60%) and African Americans (80%) lived in urban areas. Urban beneficiaries, when compared to rural peers, had higher per capita income (\$13,790 vs. \$10,136) and higher education (70% vs. 56% respectively with high school diploma). Income and education variables are proxy variables where the income and education level by zip code for whites and African Americans were assigned to individuals.

Prevalence of Psychiatric Disorders by Rural-Urban Areas

Our analyses show that 16% of Medicare elderly, whether living in rural or urban areas, had a psychiatric diagnosis as defined by ICD-9 codes (see Figure 8-1). This proportion of the elderly with any psychiatric diagnosis did not differ by the place of residence. Further, among those with any mental diagnosis, 25% had two more mental health diagnoses during the same year, that is, they were comorbid. Data on individuals who had received any psychiatric diagnosis during the three-year period were examined to

determine variations by place of residence. Figure 8-1 shows that urban elderly had a significantly higher prevalence of schizophrenia (21.1% vs. 18.1%) and mood disorders (25.4% vs. 22.7%) than rural elderly. However, the rural elderly had significantly higher rates of anxiety and phobia than their urban peers (39.6% vs. 33.2%) did. There were no differences in the prevalence of dementia and organic psychosis among the rural-urban patients.

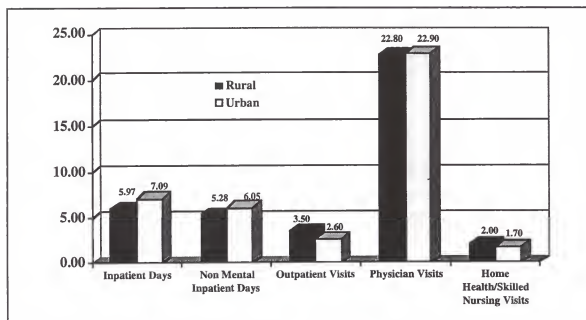
Figure 8-1: Percentage of medicare elderly with specific psychiatric diagnosis: rural-urban comparisons, 1991-1993



Service Utilization by Rural-Urban Areas

Figure 8-2 presents comparisons of type of services used by elderly residing in rural and urban areas. The two categories of residents differed only with regard to inpatient days and number of visits to outpatient clinics. While the urban elderly had significantly more hospitalization days (7.09 vs. 5.97 days), the rural elderly had significantly more outpatient visits (3.5 vs. 2.6 respectively) and home health/skilled nursing visits (2.0 vs. 1.7 respectively) than their urban peers. There were no rural-urban differences regarding visits to physicians (22.8 vs. 22.9).

**Figure 8-2: Service utilization among those with a mental diagnosis:
rural-urban comparisons, 1991-1993**

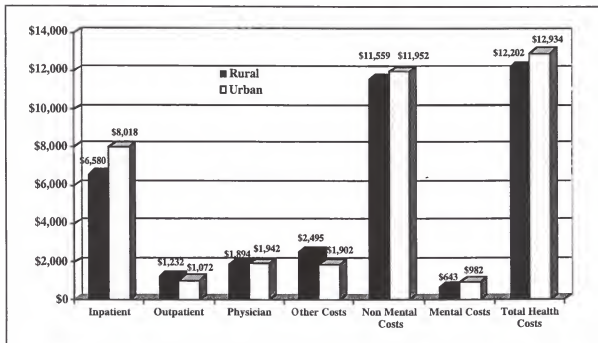


Healthcare Costs by Rural-Urban Areas

We examined four types of costs: inpatient costs, outpatient costs, physician charges, and other costs (including home healthcare and charges for skilled nursing). Total health costs includes mental health charges attached to either psychiatric diagnosis and or related procedures that were performed. All these charges are reported only on those who had at least one psychiatric diagnosis (n=5,339) during 1991-1993.

Figure 8-3 shows that the average total healthcare costs for the urban elderly were similar to their rural peers (\$ 12,934 vs. \$ 12,202). However, urban elderly as compared to their rural peers had higher costs for inpatient (\$ 8,018 vs. \$6,580) and mental health services (\$982 vs. \$943). The higher urban inpatient costs were in part due to longer hospital stays among the urban than rural patients. In contrast, rural residents had significantly higher outpatient and home healthcare costs as compared to urban patients, but the two groups were similar with regard to physician charges (\$1,894 vs. \$1,942). An additional analysis also indicated that the cost of treating mental disorder ranged from 5.3% to 7.6% of the total healthcare cost in Tennessee. The higher urban mental cost reflects greater access to mental health specialty and greater services available in urban than rural communities.

Figure 8-3: Healthcare costs among rural-urban elderly with a mental diagnosis, 1991-1993



Healthcare Cost for Specific Diagnosis

Finally, we provide total health costs for elderly with specific psychiatric diagnosis and place of residence. Table 8-1 provides annual treatment costs by specific diagnosis separately, and shows two trends: (i) the healthcare costs are higher for urban than rural residents regardless of any diagnosis, and (ii) within the diagnostic categories, regardless of rurality, elderly with organic psychosis (\$17,462) and schizophrenia (\$15,509) tended to have the highest health costs than those with anxiety and phobia (\$11,088). It is evident from the table that the total healthcare cost of urban elderly with organic psychosis and schizophrenia were substantially higher than those for the rural elderly with the same diagnoses.

Table 8-1 also shows that the health cost is lowest for those rural elderly who had anxiety and phobia disorders as compared to other diagnoses. The reader is reminded that this total cost includes treatment for medical as well as mental health problems and charges for inpatient, outpatient, physician, skilled nursing, hospice, and home healthcare. One may hypothesize that the higher costs for treating organic psychosis and schizophrenia may reflect a higher inpatient costs for these patients. Patients with anxiety and phobias are less likely to be hospitalized and hence their health cost is comparatively lower than other four diagnostic categories considered.

Table 8-1: Average total healthcare costs for specific diagnosis among mentally ill in rural and urban communities, 1991-1993

Diagnosis	Rural	Urban	Total Sample
Dementia	\$14,072 (n=487)	\$14,652 (n=879)	\$14,446
Organic Psychosis	\$16,058 (n=376)	\$18,335 (n=605)	\$17,462
Schizophrenia	\$15,146 (n=362)	\$15,694 (n= 708)	\$15,509
Mood Disorders	\$12,777 (n=454)	\$14,332 (n= 848)	\$13,790
Anxiety/ Phobias	\$10,203 (n=794)	\$11,723 (n=1,108)	\$11,088

Summary and Discussion

Previous studies have generally reported higher psychopathology in the rural communities. In this study of Medicare elderly, while overall rate of any disorder was across the rural and urban elderly, there were differences with regard to specific diagnoses in that rural patients had higher rates of anxiety and phobia disorders compared to their urban peers. The urban patients, on the other hand, had higher prevalence of dementia, schizophrenia, and mood (depression) disorders. A higher rate of depression among urban Medicare patients is consistent with other studies which have also reported higher depression rates among urban residents (Crowell et al., 1986; Mueller, 1981; Blazer et al., 1985).

The inconsistent findings associated with the rural residence in several previous studies may be a result of a number of factors. These factors may include the nature of the sample of subjects used in the study (i.e., whether the sample subjects were untreated or treated individuals) or study focus (i.e., whether the studies measured global psychopathology or focused on clinical diagnoses.). Studies that have used global assessments of psychopathology have often reported higher rates for rural populations (see Husaini and others cited above). In contrast, studies focusing on specific clinical diagnoses, have often found higher urban rates for specific disorders (e.g., of schizophrenia in Dotl & Greenley, 1997; of depression in Crowell et al., 1986; Mueller, 1981; Blazer et al., 1985). Further, since clinical diagnoses are often treatment based, the higher urban rates may also reflect lower tolerance of pathological behaviors and higher referrals for mental specialty treatment.

Finally, the health costs in the present study are consistent with the overall costs reported by others (Borenstein, 1996). Health costs for elderly with diagnosis of organic

psychosis and schizophrenia are the highest and those for anxiety (and phobias) are the lowest regardless of place of residence. In general, urban costs are higher regardless of race or diagnosis. In the area of mental health, previous studies have reported that 10% of total healthcare cost is attributable to behavioral disorders (Bernstein, 1996). Our finding that psychiatric treatment costs comprise 7.7% to 13.4% of total healthcare costs is very close to Bernstein's findings. Further, it may also be noted that treatment costs for mental health problems are higher for urban elderly than their rural counterparts. This lower rural mental health cost among the Medicare elderly may indicate inadequate mental health specialty care in rural communities.

Chapter 9

Costs of Services among Medicare Elderly

Introduction

Mental illness imposes large costs on society. These costs include the direct of costs of treatment – hospitalization, physician services, drug therapy, counseling – and productivity losses resulting from lower employment and wages and reductions in hours of work. Recent estimates by Rice and others (Rice, 1996, for example) suggest that the costs of mental illness to the United States economy in 1990 were \$67 billion in treatment costs and \$75 billion in productivity losses.

The elderly comprise an increasingly large percentage of the population of adults with mental illness. According to the 1990 census, the elderly comprised 12.5% of the population; however, this percentage will grow rapidly as the large baby boom cohort ages, with a projected elderly population of 50 million by the year 2020. In 1990, the elderly population accounted for 39 percent of all direct treatment costs for mental illness (\$26.2 billion) and a small 2.2 percent of productivity losses (Rice, 1996). Both the direct costs of treatment and productivity losses will rise as the population ages and life expectancy increases. There is concern that in the future the economy will be unable to provide the healthcare and standard of living for the baby boom cohort that the elderly enjoy today.

In this chapter, we examine the Medicare costs of mental and physical illness in the state of Tennessee and evaluate whether there are significant racial differences in these costs. We use data collected by Medicare on the costs of physician care, inpatient and outpatient services, nursing and home healthcare, and the use of hospice services; costs are measured as charges to Medicare for services and payments by Medicare for these services in Tennessee. Payments are capitated and do not reflect the true resource costs of services; charges are likely to be closer to the value of resources used in the treatment of the elderly. The population we examine includes all persons aged 65 and above who filed a claim with Medicare at some point in 1991, 1992, or 1993 and who had at least one primary diagnosis of mental health problem. The sample includes 26,496 white and African American persons in 1991, 26,644 persons in 1992, and 27,701 persons in 1993. During 1991- 1993, the average age of these Medicare patients was 75; 62 percent were female, 63 percent lived in rural counties, and 90 percent were white.

Race and Healthcare Cost

Table 9-1a presents statistics on charges and payments for services in 1991, 1992, and 1993. In 1991, the average charge for Medicare services was \$6,516; this rose to \$7,630 in 1992 and \$7,536 in 1993. In all years, the charges for treatment of African American patients were significantly higher than the charges for treatment of white patients (see Table 9-1b). For example, in 1991, the average charge for a white patient was \$6481, and the average charge for an African American patient was \$7,734. In 1993,

the difference was even larger on average; white patients were charged \$7,331 on average while African American patients were charged \$9,845.

Table 9-1a: Total health charges by year, 1991-1993

	1991	1992	1993
	(27,358)	(27,515)	(28,190)
Physician	\$1,363	\$1,294	\$1,294
Outpatient	\$678	\$876	\$918
Inpatient	\$3,944	\$4,277	\$3,885
Home Health	\$770	\$1,020	\$1,263
Hospice	\$11	\$14	\$21
Skilled Nursing	\$162	\$218	\$281
Total Charges	\$6,608	\$7,699	\$7,563

Table 9-1b: Health charges by year & race, 1991-1993

Physician	1991		1992		1993	
	White	African American	White	African American	White	African American
	(n=24,565)	(n=2,783)	(n=24,672)	(n=2,843)	(n=25,289)	(n=2,901)
Physician	\$1,367	\$1,321	\$1,500	\$1,238	\$1,334*	\$1,238
Outpatient	\$671	\$735	\$993	\$812	\$911	\$975
Inpatient	\$3,864	\$4,658*	\$4,230	\$4,695+	\$3,746	\$5,103 *
Home Health	\$720	\$1,217*	\$958	\$1,556*	\$1,176	\$2,021*
Skilled Nursing	\$155	\$222	\$219	\$210	\$271	\$372
Hospice	\$11	\$15	\$13	\$28	\$19	\$39
Total Charges	\$6,481	\$7,734*	\$7,603	\$8,540+	\$7,335	\$9,844*

* Significant at $p \leq .05$, + Significant at $p \leq .10$

To determine which components of the total costs of care were driving these large differences in average charges for African Americans and whites, we fragmented the total Medicare charges into charges for physician services, inpatient and outpatient services, skilled nursing care, home health and hospice care. There were no significant differences in the average physician charges to African American and white patients in 1991 or 1992, but in 1993, whites had significantly higher costs than did African Americans. There were

no significant differences in charges for outpatient care, skilled nursing, or hospice care in any year. The major differences in charges for the care of African American and white Medicare patients were for inpatient care and home health. In 1991, African American patients were charged \$794 more on average than whites for inpatient care, and this difference increased to \$1,357 in 1993. For home healthcare, African Americans were charged \$497 more than whites in 1991; this difference rose to \$598 in 1992 and \$845 in 1993.

Charges may reflect the costs of resources used to provide services to Medicare patients, but they do not reflect payments for these services by Medicare and the costs to Medicare. Differences in payments are significantly smaller than the differences in charges described above, but payments are still larger for the care of African American patients than for the care of white patients (Table 1c & 1d). In 1991, the average payment for the care of white patients was \$1,297 and the average payment for the care of African American patients was \$1,445; this \$148 difference was not statistically significant. By 1992, the average payment for whites rose to \$1,496 but fell to \$931 for African Americans; by 1993, however, service providers for African American patients again received a higher payment (\$1,025) than service providers for white patients (\$924) and this difference was significant. Interestingly, the percentage of charges compensated by Medicare was similar for African American and white patients in 1991 and 1993 but the reimbursement rate declined over time. In 1991, Medicare paid 20% of the charges for white patients and 19% of the charges for African American patients. In 1993, Medicare paid significantly less for both African American and white patients – 13% of charges for whites and 11% of charges for African Americans. This decline may reflect changes in policy.

Table 9-1c: Total health payments by year, 1991-1993

	1991	1992	1993
	(27,358)	(27,515)	(28,190)
Physician	\$1,312	\$1,254	\$935
Outpatient	\$215	\$270	\$314
Inpatient	\$1,662	\$1,979	\$1,880
Home Health	\$555	\$698	\$882
Skilled Nursing	\$58	\$82	\$116
Hospice	\$11	\$14	\$21
Total Charges	\$3,813	\$4,297	\$4,148

Table 9-1d: Health payments by year & race, 1991-1993

Physician	1991		1992		1993	
	White (n=24,565)	African American (n=2,783)	White (n=24,672)	African American (n=2,843)	White (n=25,289)	African American (n=2,901)
Physician	\$1,297	\$1,445	\$1,286	\$981	\$924	\$1,025*
Outpatient	\$207	\$288*	\$264	\$323*	\$301	\$420*
Inpatient	\$1,642	\$1,840	\$1,959	\$2,150	\$1,817	\$2,434*
Home Health	\$511	\$938	\$653	\$1,084*	\$819	\$1,426*
Skilled Nursing	\$57	\$66	\$82	\$77	\$115	\$129
Hospice	\$11	\$15	\$13	\$28	\$19	\$39
Total Charges	\$3,725	\$4,592*	\$4,257	\$4,643*	\$3,995	\$5,473*

* Significant at $p \leq .05$, + Significant at $p \leq .10$

To explain the significant difference in payments for treatment of African American and white patients, we examined payments for specific services. We found no significant difference in payments in any year for treatment of skilled nursing care, or hospice care. The major reason for the observed difference in average payments was the difference in compensation for inpatient care and home healthcare. In 1991, inpatient service providers for African American patients were paid about \$200 more than providers for white patients, and this difference increased to about \$600 in 1993. We observed the same trend in the payment for home health services. In 1991, home healthcare providers for African American patients were paid \$427 more than providers for white patients; in 1993 this difference increased to \$607.

To explain why African American Medicare patients were more costly to providers and to Medicare than white patients, we examined differences in the incidence of physical and mental problems. Table 9-2 presents the percentage of white and African American patients reporting each of 14 physical problems and 13 mental conditions as well as the percentage using six different types of physician. Significant differences between African Americans and whites in diagnosis and physician choice are indicated by the chi-squared statistics. From this table, we see that, among the 14 physical problems, African American patients were significantly more likely to report hypertension, circulatory problems, or metabolic problems in all three years; they were also more likely to report a stroke in 1992 and 1993. Among the other physical problems, African Americans were significantly less likely to report cancer, nervous disease, digestive disease, genitourinary disease, skin disease, or musculoskeletal problems. Among the 13 possible mental problems, African Americans had a higher incidence of organic brain disease, schizophrenia, alcohol dependence, and nonpsychotic brain disorder while whites

had a higher incidence of affective psychosis, neurosis, and adjustment reaction. Because the diagnoses of African American patients differed from the diagnoses of white patients on average, the cost differences described above could be explained if African Americans were more likely to have conditions that required more costly physician, institutional, and nursing care than white patients. We examine these cost differences in the next section of the paper.

Finally, we examined African American-white differences in the choice of physician. From Table 9-2, we see that in all three years, there are no differences in the choice of psychologists, psychiatrists, neurologists, or geriatric specialists; however, in each year, white patients were more likely to report treatment by a general practitioner, internist or gynecologist than African American patients. If treatment by a general practitioner or internist was less costly than treatment by a mental health professional or other specialist, then this difference in physician choice may explain some of the differences in charges and payments for the treatment of African American and white Medicare patients. We examine these differences in costs in the next section of the paper.

Cost Functions

To determine the relative importance of demographic traits, reported health problems, and physician type on physician costs, we estimated cost functions over the Tennessee sample. In theory, healthcare costs are conditioned on the prices of treatment inputs, the condition being treated, and the characteristics of patients that may affect the type of treatment prescribed and the response of the patient to treatment. With the Medicare data, we were limited in the explanatory variables that we could examine. First, to measure the effect of health on cost, we statistically controlled for 13 different mental health conditions and 14 different physical health conditions.¹ For each health condition, we included in the model a dummy variable equal to one (1) if the condition was reported at least once during the last 12 months and zero (0) if that condition was never reported. Based on estimates by Rice and collaborators (1991, 1995, 1996), we expected to find that physician treatment for affective disorders and schizophrenia was more costly than the treatment for drug and alcohol abuse and neuroses such as anxiety.

¹ The mental health conditions are: alcoholism or alcohol dependence; drug psychosis or drug dependence; psychosis; adjustment reaction; affective psychosis; conduct disturbance; depression; mental disorder (unspecified); neurotic disorder; nondependent drug problems; nonpsychotic mental problems; other nonorganic mental problems; personality disorder; psychiatric problem with other disease; senility; sexual deviation; and stress. The physical health conditions are: blood disease; neoplasms; congenital problems; delay in development; digestive problems; endocrine problems; hypertension; hyperkinetic problems; ill-defined problems; infectious and parasitic diseases; musculoskeletal problems; nervous system problems; other organic problems; problems of perinatal origin; physiological-mental problems; pregnancy; respiratory problems; skin problems; special syndromes; stroke; transient organic problems; and genitourinary problems.

To control for physician input prices, we included seven dummy variables for type of physician; these were equal to one (1) if that type of provider was used during the year and equal to zero (0) if that type was never used.² We expected general practitioners to be less costly than mental health specialists.

Finally, we controlled for the age, sex, race, and location of the patient; location was measured by a dummy variable for rural county and by median per capita income in the county. We expected the costs of physician services to rise with age, but we had no predictions concerning sex and race differences in costs. There is evidence that women are more likely to seek treatment for health problems than men are (e.g., Sindelar, 1982); if women file more claims than men do, then they may be more costly than men. However, their greater access can also mean that they are treated before conditions are life threatening or require institutionalization; in this case, women may cost less than men. There is also evidence that elderly African Americans are less likely to seek treatment than elderly whites (Husaini, Moore, and Linn, 1990). Again, this racial difference, if consistent in Tennessee, may be associated with higher or lower annual costs of treatment. We also expected healthcare costs to be lower in rural counties than in urban counties. Income may be positively associated with treatment costs. If the county was richer on average, then quality of care and costs may be higher as a result; on the other hand, income is positively associated with good health practices such as exercise, better nutrition, less smoking and lower alcohol consumption. If these practices dominate, then healthcare costs may be lower in wealthier counties.

The outcome in which we were interested is the costs for healthcare services. We had two measures of costs for each year: charges to Medicare for each patient and payments actually made by Medicare. Submitted charges were higher than actual payments made by HCFA. We estimated separate cost models for both of these cost measures. If submitted charges are close to the actual resource costs of physician services for the treatment of Medicare patients, then a comparison of submitted charges to payments measures the extent to which Medicare imposes a resource cost on healthcare providers and society as a whole. In addition, submitted charges may be a better measure of the resource costs of physician services than capitated payments.

We used linear regression to estimate the cost functions. Costs were regressed on demographic characteristics, physician type, and health conditions. The coefficient on the continuous variable (age and income) was interpreted as the dollar change in charges or payments associated with a one unit increment in the variable. The coefficient on each dummy variable measured the difference in the costs associated with persons in the group relative to persons not in the group. From the estimated coefficients and values of the independent variables, we obtained predictions of the costs of healthcare that could be used in social benefit-cost analysis of the treatment of mental health.

² The physician types are: psychologist or clinical psychologist; geriatrics specialist; general practitioner; neurologist; psychiatrist; psychiatrist/neurologist; other doctor; and unknown doctor type.

Results of Regression Analyses

Regression results are presented in Table 9-3a - 9-11a (submitted charges) and Tables 9-3b - 9-11b (actual payments). We begin with a discussion of the models of total charges and total payments (Tables 9-3a and 9-3b). The explanatory power of the model of total charges was greater than the explanatory power of the payments model. About 20 percent of the variation in charges for each year was explained by the regression model in Table 3a; however, only in 1993 was the regression model able to explain more than 2% of the variation in payments. In 1991 and 1992, about 1.5% of the variation in payments was explained while, in 1993, 23% of the variation was explained. This is suggestive of a significant change in policy over time towards more systematic reimbursement for specific medical conditions and treatment costs.

In the model of total charges, charges differed significantly between African Americans and whites; this result was consistent with the descriptive analysis in Tables 9-1a - 9-1d and 9-2. In 1991, African Americans were charged on average \$1,394 more than whites, and this race difference rose to \$2,241 in 1993. However, racial differences in payments were much smaller. In 1991, there were no significant racial differences in payments, but by 1993, providers for African American patients received \$1,295 more than providers for whites. These marginal effects were estimated, controlling for differences in diagnosis and treatment.

In all of these regressions, we estimated significant differences in the cost of physician care by sex, age, and county characteristics. As patients aged, the costs of treatment rose as expected. Each additional year of age increased charges \$55 in 1991, \$80 in 1992, and \$100 in 1993, but only increased payments by about \$76 in 1992 and 1993. In all three years, male patients were charged more than female patients (\$1,307 in 1991, \$1,207 in 1992 and \$1,111 in 1993) and providers were paid more for the treatment of men than for the treatment of women (\$1,166 in 1991, \$505 in 1993). Even if women were more frequent users of services, the costs of their care were lower. Among county characteristics, rural residence was weakly related to charges and payments, but income had a negative impact on costs. A \$100 increase in per capita income lowered charges by \$49 in 1991, \$70 in 1992, and \$119 in 1993 and lowered payments by \$69 in 1993. Payments were actually higher in higher income counties in 1992.

The uncontrolled mean differences in charges and payments for 1991 were \$1,253 and \$868 (not significant) respectively; the mean differences for 1992 were \$937 and \$57 (not significant); and the mean differences for 1993 were \$2,514 and \$1,467 (Table 1). When we controlled for demographic and county characteristics, the effect of ethnicity resulted in charges which fell to \$919 in 1991, \$245 in 1992, and \$1,444 in 1993, and payments which fell to \$375 in 1991, rose to \$1,584 in 1992, and fell to \$871 in 1993. Differences in costs were reduced by more than 50 percent (except for payments in 1992) when differences in demographic traits and county income were taken into account.

Among physicians, general practitioners, internists, and gynecologists submitted lower charges and received lower payments from Medicare than neurologists, psychologists, or other specialists. In 1991, for example, patients receiving care from a

general practitioner, internist, or gynecologist were charged \$903 more than other patients, but these physicians received only an insignificant \$326 more in Medicare payments. In contrast, patients receiving care from a neurologist were charged \$9,636 more than other patients were, and payments were \$7,968 higher. The same pattern existed in 1992 and 1993, but payments were smaller.

Among physical health conditions, the highest charges were for the treatment of blood disease, stroke, and congenital anomalies in all three years; the lowest charges were for the treatment of hypertension and musculoskeletal problems. In 1991, hypertension charges were \$3,170 less than for other conditions while stroke charges were \$5,023 higher than other conditions; by 1993, relative hypertension charges fell by \$420, and charges for the treatment of stroke rose to \$5,986. Payments for these conditions were significantly lower than charges; in 1991, payments were not affected by the diagnosis of hypertension but were \$1,768 lower in 1993. For the treatment of stroke patients, payments were not affected by the diagnosis of a stroke in 1991 but were \$3,287 higher than payments for other conditions in 1993.

Among mental health problems, only organic problems had significant effects on charges in 1991; by 1993, charges were also higher for the treatment of schizophrenia (\$6,059), affective psychosis (\$2,295), other nonorganic problems (\$4,767), adjustment reaction (\$4,505) and nonpsychotic brain disorders (\$4,534). However, payments were not affected by mental health diagnosis in 1991 or 1992, but in 1993 payments for non-organic problems, adjustment reaction, non-psychotic brain disorders, and organic brain disorders were higher than for other mental health conditions but were significantly less than charges.

From the analysis of total charges and payments, we can explain some of the racial differences observed in Tables 9-1a - 9-1d and 9-2. African Americans were more likely to report strokes, which were relatively expensive conditions to treat, but they were also more likely to have a diagnosis of hypertension which was relatively inexpensive to treat. African Americans were also more likely to report schizophrenia, organic brain disorders, and non-psychotic brain disorders which were more expensive to treat than other mental health problems. African Americans were also less likely to use the services of the least costly physicians – general practitioners, internists, and gynecologists—but they were also not significant users of the most expensive specialists. Controlling for these health and physician choice characteristics, African American patients were still charged more than white patients for the treatment of physical and mental health problems, and payments for the services used by African American patients were higher. These remaining differences cannot be explained by differences in health or physician choice.

However, controlling for differences in physician choice and diagnosis increased the effect of race on charges and payments. In comparison to the effects of race, controlling for demographic and county traits alone, the effect of race resulted in charges increasing from \$919 to \$1,394 in 1991, from \$245 to \$1,066 in 1992, and from \$1,444 to \$2,241 in 1993. Similar results were found for payments; the effect of race resulted in payments increasing from \$375 to \$581 in 1991, from \$1,584 to \$1,988 in 1992, and from

\$871 to \$1,295 in 1993. In other words, on average, African Americans had lower cost diagnoses and lower cost physicians.

The charges and payments models were estimated separately for eight broad categories of services: skilled nursing (Tables 9-4a and 9-4b), home healthcare (Tables 9-5a and 9-5b), hospice care (Tables 9-6a and 9-6b), physician services (Tables 9-7a and 9-7b), inpatient services (Tables 9-8a and 9-8b), outpatient services (Tables 9-9a and 9-9b), inpatient mental health services (Tables 9-10a and 9-10b), and outpatient mental health services (Tables 9-11a and 9-11b). The explanatory power of these regressions was, in general, quite low; exceptions were the inpatient mental and physical health services models where between 20 and 30 percent of the variation in charges and payments was explained by the models.

In all models, African Americans, on average, accounted for higher charges and payments for services, but these differences were insignificant for inpatient and outpatient mental health services and for skilled nursing care; in other models, racial differences were statistically significant and increased over time. For example, home healthcare charges were \$236 higher for African American patients than for whites in 1991, and this racial difference increased to \$617 in 1993; payment differences were not significant in 1991 but rose to \$439 in 1993. Charges and payments for physician services for African Americans and whites were also equivalent in 1991, but African Americans were charged \$237 more than whites by 1993 while physicians received \$189 more for the treatment of African Americans in 1993 than of whites. The largest racial differences were for inpatient service costs; African American patients were charged \$851 more than whites in 1991 and \$1149 more in 1993 while payment differentials rose from \$215 to \$484. These differences were detected after controlling for racial differences in mental and physical health and in the choice of physician.

Other demographic traits were also important in explaining charges and payments. In all models, charges and payments increased with the age of the patient, and these age effects rose over time. In the inpatient and physician models, charges and payments for the treatment of men exceeded charges and payments for the treatment of women; home healthcare was the only case in which charges and payments for the treatment of women exceeded charges and payments for the treatment of men. In a few cases, county characteristics were important. Home health services were less expensive in rural counties while inpatient services were more expensive in rural counties.

Choice of physician was significant in the charges and payments for physician services and inpatient services for the treatment of physical and mental health problems. In almost all cases, neurologists, and psychiatrists (also clinical psychologists) charged more for services and received higher payments than other specialists; the use of these specialists also accounted for significantly higher inpatient charges and services. For example, if the patient reported a claim for the services of a neurologist in 1991, Medicare was charged an additional \$1,074 for physician services and paid out an additional \$4,52; the use of a neurologist increased inpatient charges by \$7,548 and payments for inpatient services by \$2,545. This was compared to the charges and payments attributed to general

practitioners or internists. In 1991, inpatient charges were \$267 higher and physician charges were \$138 higher if a general practitioner or internist was used, but payments for these services were not affected. These differences persisted over time.

Finally, we examined the effect of physical and mental health diagnosis on charges and payments for specific healthcare services. Among physical health problems, hypertension and stroke consistently accounted for significant differences in costs. Patients with hypertension reported lower skilled nursing, home health, inpatient, outpatient, and physician charges while patients with stroke had significantly higher charges and payments; charges and, to a lesser extent, payments systematically increased over time for stroke patients. Congenital anomaly, conditions of perinatal origin, infectious diseases, circulatory disease, and cancers accounted for the largest increases in inpatient and physician charges and payments. As expected, physical health diagnoses were not systematically related to inpatient and outpatient mental health costs.

Mental health diagnoses were not systematically related to inpatient and outpatient physical health costs, but inpatient and outpatient charges and payments for the treatment of mental health problems was related to mental health diagnosis. Substance abuse (alcohol or drug dependence) was the most costly diagnoses followed by depression, psychophysiologic conditions, and neurotic conditions.

Summary and Discussion

In this paper, we examined Medicare data for the state of Tennessee from 1991-1993 and measured differences in the costs of Medicare services for African American and white patients. Analysis of mean differences in charges and payments for health services suggested that African American patients were more costly than white patients in Tennessee were and that these differences were increasing over time. We found that African American patients were more likely to use the more costly physician specialists than white patients and were more likely to report costly health problems such as stroke, metabolic disease, circulatory disease, alcohol dependence, schizophrenia, and organic brain disease. However, when we controlled for health diagnoses and for physician choice, racial differences in charges and payments persisted. In 1993, African American patients cost Medicare \$1,295 more than white patients and this racial difference increased significantly since 1991. Why this racial difference persisted is as yet unknown. From Medicare records, we could not control for important individual differences in wealth, education, family background, or environment (which are likely important explanators of the use of health services), the propensity to develop health problems, and survival. In the future, research should focus on these individual differences as likely causes of the racial disparity in the costs of the healthcare of the elderly.

Table 9-2: Prevalence rate of select physical and mental health problems, and rate of specialist utilization by year, 1991-1993

Variables	1991		1992		1993	
	White	African American	White	African American	White	African American
Physical problems:						
Infectious disease	87.3	85.5	78.8	76.7	79.0	88.9
Neoplasms	161.4	93.8	169.6	107.3	164.1	107.2
Metabolic disease	236.9	269.5	251.6	272.2	252.1	282.7
Blood disease	58.5	61.1	62.9	68.2	63.6	66.5
Nervous disorder	433.1	348.9	443.1	359.1	434.1	363.0
Circulatory disease	521.7	609.8	545.9	617.0	544.8	635.0
Respiratory disease	163.6	105.3	156.9	90.0	158.8	97.9
Digestive disease	194.8	177.5	210.7	166.4	200.4	160.3
Genitourinary disease	265.7	209.5	287.8	219.8	282.2	224.8
Skin disease	185.1	115.3	203.3	122.1	191.6	116.9
Musculoskeletal disease	304.3	270.6	319.4	288.8	319.8	293.3
Congenital anomaly	17.7	10.4	16.3	13.7	15.0	13.8
Ill-defined condition	468.3	439.8	503.2	450.9	500.5	441.2
Hypertension	264.3	411.1	280.5	106.6	288.9	434.3
Stroke	73.8	83.4	79.8	84.8	82.7	98.2
Mental problems:						
Mental disorder	90.9	83.0	96.9	95.7	88.1	89.6
Senility	21.5	25.5	23.5	33.1	21.9	29.6
Alcoholic psychosis	0.6	0.4	0.5	1.1	0.5	0.3
Drug psychosis	0.7	0.0	0.7	0.4	0.3	0.7
Transient organic	4.8	5.4	4.5	4.2	5.2	5.5
Other organic psychosis	3.7	7.2	3.3	7.0	3.9	9.3
Schizophrenia	2.7	3.6	2.8	4.9	2.6	4.1
Affective psychosis	13.1	6.1	14.7	8.1	14.3	6.2
Paranoid state	0.4	0.4	0.4	0.4	0.8	0.0
Other nonorganic	11.9	13.3	12.4	13.4	13.6	17.9
Neurotic disorder	26.7	15.1	27.9	14.8	23.0	13.1
Personality disorder	0.4	0.4	0.4	0.7	0.4	0.3
Sexual disorder	0.9	0.4	1.6	0.7	0.9	0.7
Alcohol dependence	0.6	0.2	0.7	1.8	0.8	3.1
Drug dependence	0.4	0.0	0.3	0.0	0.1	0.0
Nondpendent drug abuse	1.0	0.7	1.5	2.1	1.2	0.0
Psychophysiologic	0.9	1.1	0.5	1.1	0.5	0.7
Special syndrome	3.5	4.0	3.7	2.8	4.4	1.7
Acute reaction to stress	1.4	1.4	1.3	1.1	0.7	0.3
Adjustment reaction	2.8	0.7	3.2	4.9	3.4	3.4
Nonpsychotic brain prob.	8.2	12.2	6.9	13.0	4.9	9.7
Depression	10.1	5.7	12.8	6.0	10.4	6.9
Conduct disturbance	15.6	19.0	0.2	0.7	0.6	1.4
Emotional disturbance	0.0	0.0	0.0	0.0	0.0	0.0

Table 9-2: Prevalence rate of select physical and mental health problems, and rate of specialist utilization by year, 1991-1993, cont.

Variables	1991		1992		1993	
	White	African American	White	African American	White	African American

Physician:

GP/Internist/OBGYN	784.5	710.7	851.0	803.4	859.0	815.6
Neurologist	56.5	48.1	56.0	53.5	55.8	50.3
Psychiatrist	26.4	26.9	30.1	35.5	30.4	27.2
Geriatrics specialist	0.6	0.4	4.5	3.2	6.8	8.6
Psychologist	0.5	0.4	0.2	0.0	0.1	0.0
Clinical psychologist	0.7	1.1	5.9	12.3	7.3	11.7
Other specialist	933.4	920.6	930.8	906.8	917.8	885.9

Boldface = Significant.

Table 9-3a: Total health charges by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-8083.262292	-7.613	-8812.408857	-7.133	-9574.032114	-8.81
Black(=1)	1394.186525	4.148	1065.634387	2.734	2241.364751	6.412
Male(=1)	1307.270725	6.865	1290.465903	5.801	1111.042465	5.62
Rural county (=1)	549.696759	2.63	271.051969	1.113	231.699649	1.065
Age in years	54.645783	4.273	80.105761	5.389	99.965368	7.577
Per capita income, county	-0.049082	-2.289	-0.070758	-2.842	-0.118789	-5.342
Physical problems:						
Infectious disease	4147.129173	12.822	6756.360628	17.165	6006.00762	17.237
Neoplasms	3297.790223	12.938	4112.547671	14.142	3563.553092	13.607
Metabolic disease	2745.530532	12.791	3065.393448	12.409	2716.335597	12.395
Blood disease	5396.023799	13.975	6361.946435	14.574	6252.443401	16.143
Nervous disorder	-950.168961	-5.025	-854.492369	-3.897	-942.85894	-4.797
Circulatory disease	4880.98906	20.153	5152.393156	18.194	5450.117139	21.24
Respiratory disease	-14.820501	-0.059	-820.804501	-2.745	-353.729916	-1.346
Digestive disease	4400.911389	18.596	5493.85015	20.399	4648.896306	18.987
Genitourinary disease	2277.972161	10.817	2265.02755	9.464	2030.268218	9.441
Pregnancy, puerperium	2839.02828	1.515	1194.64296	0.513	7053.522715	3.049
Skin disease	286.796492	1.197	196.202661	0.73	538.058831	2.185
Musculoskeletal disease	557.591962	2.761	531.174773	2.287	972.050348	4.685
Congenital anomaly	5033.983426	7.18	8602.708775	10.331	4014.863588	5.209
Perinatal origin	5721.99577	2.142	8603.96929	3.18	9626.772144	3.77
Ill-defined condition	4566.96345	23.461	5010.258369	21.952	5146.920496	25.203
Hypertension	-3170.884806	-12.458	-3158.497869	-10.87	-3590.993532	-13.745
Stroke	5023.031567	13.578	6056.218294	14.453	5986.208261	16.22
Mental problems:						
Mental disorder	1007.501025	1.362	1309.417023	1.609	339.238381	0.448
Senility	869.198192	1.04	278.062472	0.295	-272.576874	-0.312
Alcoholic psychosis	4679.795026	1.211	2336.298265	0.529	3757.354118	0.868
Drug psychosis	4365.5423	1.257	-2508.661823	-0.618		
Transient organic	3573.331865	2.542	5087.50557	3.063	8390.255	6.038
Other organic psychosis	6940.359243	4.672	3312.60195	1.812	2244.705	1.486
Schizophrenia	1295.742172	0.712	-173.844863	-0.084	6059.463	3.106
Affective psychosis	917.411765	0.852	2690.665635	2.211	2295.237	2.074
Paranoid state	10214	2.181	-2846.185392	-0.519	2685.641	0.749
Other nonorganic	1550.21544	1.641	2964.747144	2.776	4767.014	5.13
Psychoses of childhood			-2109.03	-0.123	-13639	-1.236
Neurotic disorder	-678.756113	-0.832	-1178.97	-1.295	-356.965	-0.415
Personality disorder	8306.447876	1.789	8803	1.621	5344.861	1.029
Sexual disorder	-503.14499	-0.161	-5199.12	-1.879	-1132.246	-0.363
Alcohol dependence	4622.579302	1.399	2882.625	0.758	-2551.381	-0.803

Table 9-3a: Total health charges by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-4216.611377	-0.904	35412	5.285	4895.844	0.545
Nondpendent drug abuse	-1391.489503	-0.469	1310.745	0.475	-1006.224	-0.346
Psychophysiologic	-1587.709175	-0.523	3831.602	0.864	10830	2.5
Special syndrome	-2773.856911	-1.711	-4289.36	-2.341	-145.563	-0.093
Acute reaction to stress	-3285.181958	-1.355	-2271.543	-0.726	4046.658	1.094
Adjustment reaction	577.439435	0.315	-1176.36	-0.604	4505.404	2.67
Nonpsychotic brain prob.	169.83689	0.153	-1058.65	-0.785	4533.917	3.293
Depression	-1962.713375	-1.909	-1809.71	-1.675	201.737	0.191
Conduct disturbance	-9424.856114	-1.692	-4638.82	-0.761	5941.938	1.653
Emotional disturbance	-19056	-1.298				
Hyperkinetic syndrome	3821.348873	0.452	3937.699	0.231	1879.995	0.171
Development delay	-6902.73867	-0.472	-16796	-1.388	-4224.909	-0.272
Other psychic factors	-8887.280883	-1.48	37194	4.83	-4419.565	-0.49
Physician:						
GP/internist/OBGYN	903.397732	3.806	-529.848	-1.615	-381.363	-1.306
Neurologist	9635.740645	23.193	11004	22.482	8919.154	20.284
Psychiatrist	5010.798735	6.381	3867.499	4.436	3196.94	4.083
Geriatrics specialist	6022.127488	1.585	2076.065	1.299	3812.705	3.379
Psychologist	724.509798	0.17	-10539	-1.373	-9506.87	-0.864
Clinical psychologist	89.205732	0.024	10649	7.627	6270.566	5.494
Other specialist	1393.518547	3.602	1215.494	2.761	1213.157	3.293
R-squared		0.204		0.204		0.227
F-statistic		120.727		121.305		143.955
Sample size		26496		26644		27701

Boldface = Significant.

Table 9-3b: Total health payments by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-5299.337149	-1.96	-9484.307704	-2.998	-6643.892202	-12.449
Black(=1)	581.761987	0.68	1988.504504	1.992	1294.715264	7.542
Male(=1)	1166.118701	2.405	220.119386	0.386	505.495366	5.207
Rural county (=1)	-230.061769	-0.432	-1284.005703	-2.058	82.830983	0.775
Age in years	54.35305	1.669	76.875737	2.019	76.459829	11.801
Per capita income, county	-0.096772	-1.773	0.220208	3.454	-0.068939	-6.313
Physical problems:						
Infectious disease	1238.194103	1.504	4423.010776	4.388	2639.217528	15.424
Neoplasms	3221.51275	4.965	2472.078186	3.32	1830.368317	14.231
Metabolic disease	2296.371377	4.202	2592.346706	4.098	1350.83544	12.552
Blood disease	1363.953141	1.388	2543.31469	2.275	2723.783392	14.32
Nervous disorder	-1361.662996	-2.829	1.169007	0.002	-381.672773	-3.954
Circulatory disease	2665.24595	4.323	3344.531321	4.612	2690.403011	21.351
Respiratory disease	-435.43683	-0.684	-146.469935	-0.191	-124.508986	-0.965
Digestive disease	2209.434302	3.667	3245.299893	4.706	2221.343913	18.474
Genitourinary disease	2013.603987	3.756	2442.873785	3.986	1039.924461	9.847
Pregnancy, puerperium	736.765779	0.154	-398.130943	-0.067	3642.857981	3.207
Skin disease	144.657339	0.237	-982.580361	-1.427	317.4716	2.626
Musculoskeletal disease	1075.844344	2.092	-3.270595	-0.005	492.696933	4.835
Congenital anomaly	7433.265505	4.165	2559.666251	1.2	2037.928119	5.384
Perinatal origin	2617.463155	0.385	2620.498711	0.378	5465.528227	4.359
Ill-defined condition	1742.202063	3.516	3097.474443	5.3	2694.713681	26.869
Hypertension	-1007.906748	-1.556	-1267.191652	-1.703	-1768.714022	-13.786
Stroke	1611.715991	1.711	809.222963	0.754	3286.665859	18.133
Mental problems:						
Mental disorder	128.378686	0.068	-49.664544	-0.024	-134.991529	-0.363
Senility	724.220962	0.34	415.303172	0.172	212.975136	0.497
Alcoholic psychosis	2271.701676	0.231	1881.439185	0.166	935.72339	0.44
Drug psychosis	1275.977975	0.144	-1894.728199	-0.182		
Transient organic	631.299086	0.176	1203.612843	0.283	2782.98388	4.078
Other organic psychosis	2089.220436	0.552	984.715032	0.21	787.71441	1.062
Schizophrenia	1828.765342	0.395	1455.95119	0.275	4663.967009	4.868
Affective psychosis	-235.857738	-0.086	416.023827	0.133	1208.453753	2.224
Paranoid state	4879.189415	0.409	-1272.12532	-0.091	-785.745219	-0.446
Other nonorganic	868.664093	0.361	537.732336	0.197	2164.300205	4.743
Psychoses of childhood			-8017.076598	-0.183	-7227.599292	-1.334
Neurotic disorder	-369.191074	-0.178	-815.956283	-0.35	193.151994	0.457
Personality disorder	1569.98316	0.133	1834.716676	0.132	4484.762349	1.759
Sexual disorder	-2352.329801	-0.295	-2843.177504	-0.401	-162.883198	-0.106
Alcohol dependence	-20.998564	-0.002	2072.388148	0.213	-263.90413	-0.169

Table 9-3b: Total health payments by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-3254.735916	-0.274	8868.444162	0.517	3450.667192	0.782
Nondependent drug abuse	-628.732186	-0.083	1248.791884	0.177	-329.830822	-0.231
Psychophysiology	-1117.04102	-0.144	1001.292231	0.088	6342.244833	2.981
Special syndrome	-1075.90593	-0.261	-3820.983364	-0.814	-573.074912	-0.749
Acute reaction to stress	-2109.493023	-0.342	-1162.707342	-0.145	1770.486596	0.974
Adjustment reaction	13.596463	0.003	-393.038953	-0.079	2149.044582	2.594
Nonpsychotic brain prob.	1021.398737	0.362	-850.420022	-0.246	2125.484693	3.143
Depression	-1084.205684	-0.414	-1023.438792	-0.37	579.9171	1.116
Conduct disturbance	-4703.16065	-0.332	325.210389	0.021	2441.13531	1.383
Emotional disturbance	-6936.410543	-0.186				
Hyperkinetic syndrome	3679.772723	0.171	2285.673325	0.052	1809.6744	0.336
Development delay	-1617.587602	-0.043	-8833.01718	-0.285	-2095.799721	-0.275
Other psychic factors	-4861.067904	-0.318	12194	0.618	-1841.328759	-0.416
Physician:						
GP/Internist/OBGYN	325.807346	0.539	-740.987947	-0.882	-157.166605	-1.096
Neurologist	7967.729543	7.533	9912.247005	7.908	3956.140887	18.321
Psychiatrist	2199.362453	1.1	838.808232	0.376	1140.248935	2.965
Geriatrics specialist	3768.465583	0.39	-734.96014	-0.18	1745.820003	3.151
Psychologist	463.768503	0.043	-5279.561697	-0.269	-4364.553125	-0.807
Clinical psychologist	-877.225865	-0.093	4438.630001	1.241	2820.48807	5.032
Other specialist	1096.782883	1.114	69.589545	0.062	819.437555	4.529
R-squared		0.014		0.015		0.227
F-statistic		6.683		6.973		147.149
Sample size		26496		26644		27701

Boldface = Significant

Table 9-4a: Skilled nursing charges by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-678.387911	-5.816	-956.298512	-6.529	-1199.009018	-7.341
Black(=1)	66.772628	1.808	-16.663269	-0.361	76.424179	1.455
Male(=1)	-31.480242	-1.505	-27.032682	-1.025	-50.336258	-1.694
Rural county	0.60978	0.027	-50.799806	-1.759	-29.38586	-0.899
Age in year	7.8919	5.617	12.489199	7.087	14.79933	7.463
Per capita income, county	0.00184	0.781	-0.000507	-0.172	-0.000157	-0.047
Physical problems:						
Infectious disease	156.734408	4.411	265.980359	5.7	487.719592	9.313
Neoplasms	0.583995	0.021	6.462547	0.187	1.082977	0.028
Metabolic disease	154.823451	6.566	131.656286	4.495	154.207544	4.682
Blood disease	64.036733	1.51	73.761045	1.425	142.851237	2.454
Nervous disorder	-35.681825	-1.718	-64.819707	-2.493	-118.748205	-4.02
Circulatory disease	63.383051	2.382	57.935976	1.726	166.467326	4.316
Respiratory disease	-65.41443	-2.38	-158.155303	-4.462	-72.493515	-1.835
Digestive disease	37.789644	1.454	166.464045	5.214	85.547782	2.325
Genitourinary disease	0.857875	0.037	58.55895	2.064	46.384857	1.435
Pregnancy, puerperium	358.234547	1.74	-401.428891	-1.455	-60.899115	-0.175
Skin disease	77.497322	2.943	69.603555	2.183	93.293988	2.521
Musculoskeletal disease	28.339889	1.277	4.848539	0.176	66.358401	2.128
Congenital anomaly	99.896763	1.297	38.786522	0.393	-155.263164	-1.34
Perinatal origin	665.891655	2.269	378.017681	1.178	1407.530902	3.668
Inn-defined condition	139.00139	6.5	156.808829	5.795	207.551857	6.762
Hypertension	-81.281064	-2.907	-110.374882	-3.204	-169.585477	-4.319
Stroke	707.616132	17.411	784.050001	15.783	849.242759	15.309
Mental problems:						
Mental disorder	566.866405	6.978	363.652257	3.77	47.285594	0.416
Senility	-10.700154	-0.117	85.468599	0.764	626.466518	4.772
Alcoholic psychosis	60.694282	0.143	-442.813326	-0.846	3169.151017	4.868
Drug psychosis	861.727732	2.258	-660.744851	-1.374		
Transient organic	127.861202	0.828	267.873362	1.36	368.38766	1.764
Other organic psychosis	-320.974537	-1.967	761.721217	3.515	558.431259	2.46
Schizophrenia	-473.573451	-2.369	-477.200593	-1.944	238.525109	0.813
Affective psychosis	-334.174474	-2.826	-391.347992	-2.713	240.592703	1.447
Paranoid state	1414.388761	2.749	891.636286	1.37	-1063.225299	-1.972
Other nonorganic	71.928775	0.693	268.084403	2.117	764.426865	5.473
Psychoses of childhood			-356.774952	-0.176	-2128.087482	-1.283
Neurotic disorder	-450.956398	-5.03	-268.787258	-2.491	-145.421099	-1.125
Personality disorder	-10.939551	-0.021	-334.651267	-0.52	1551.935592	1.989
Sexual disorder	-562.97639	-1.638	-298.962505	-0.911	-17.668578	-0.038
Alcohol dependence	-669.879405	-1.846	-346.382686	-0.768	-456.305741	-0.955

Table 9-4a: Skilled nursing charges by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-602.775359	-1.177	-646.964683	-0.814	-1248.274272	-0.924
Nondependent drug abuse	-195.635689	-0.6	-454.000634	-1.388	49.700091	0.114
Psychophysiology	-355.840504	-1.067	-700.959197	-1.334	-494.508048	-0.759
Special syndrome	-510.488326	-2.867	-645.274851	-2.97	273.159162	1.167
Acute reaction to stress	-640.648369	-2.406	-624.381824	-1.683	-519.19096	-0.933
Adjustment reaction	-562.384428	-2.793	80.02581	0.347	1027.890257	4.053
Nonpsychotic brain prob.	660.360357	5.43	356.446094	2.23	689.813227	3.333
Depression	-455.867429	-4.036	52.77438	0.412	-142.103757	-0.894
Conduct disturbance	-614.913253	-1.005	-968.022972	-1.34	204.429102	0.378
Emotional disturbance	-397.044613	-0.246				
Hyperkinetic syndrome	-776.720327	-0.836	-388.975145	-0.192	-913.688877	-0.554
Development delay	-611.385938	-0.38	-1447.011297	-1.009	-111.284839	-0.048
Other psychic factors	-720.31843	-1.092	16991	18.613	-267.13988	-0.197
Physician:						
GP/internist/OBGYN	0.973003	0.037	-9.598597	-0.247	14.066634	0.32
Neurologist	173.364129	3.798	339.957608	5.858	176.256705	2.667
Psychiatrist	13.66146	0.158	289.754383	2.804	28.991453	0.246
Geriatrics specialist	4600.193213	11.021	196.193298	1.036	187.010295	1.103
Psychologist	-301.974879	-0.645	-983.025716	-1.08	-1033.532913	-0.625
Clinical psychologist	-436.667395	-1.076	437.751	2.645	895.510189	5.221
Other specialist	-5.986173	-0.141	13.852851	0.265	18.754504	0.339
R-squared						
	0.049		0.055		0.049	
F-statistic						
	24.13		27.587		26.075	
Sample size						
	26496		26644		27701	

Boldface = Significant

Table 9-4b: Skilled nursing payments by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-290.215115	-7.625	-379.607401	-7.524	-605.316387	-9.771
Black(=1)	2.430382	0.202	-10.893087	-0.684	6.848982	0.344
Male(=1)	-7.582454	-1.111	-20.736637	-2.283	-24.581905	-2.181
Rural county	11.373767	1.518	-8.74806	-0.879	-5.507338	-0.444
Age in year	3.521793	7.682	4.86002	8.007	7.488483	9.957
Per capita income, county	6.0446E-05	0.079	0.000103	0.101	0.000888	0.701
Physical problems:						
Infectious disease	53.204412	4.589	94.22003	5.862	187.310911	9.43
Neoplasms	-2.77647	-0.304	4.701487	0.396	12.888955	0.863
Metabolic disease	46.20898	6.006	49.631313	4.92	63.208384	5.06
Blood disease	30.347719	2.193	11.777019	0.661	62.842637	2.846
Nervous disorder	-16.171899	-2.386	-14.829245	-1.656	-46.986457	-4.194
Circulatory disease	25.146456	2.897	21.49068	1.858	64.618407	4.418
Respiratory disease	-22.722922	-2.534	-55.771993	-4.568	-38.571164	-2.574
Digestive disease	8.610968	1.015	61.474924	5.59	38.607478	2.766
Genitourinary disease	5.484809	0.727	26.783014	2.741	26.089863	2.128
Pregnancy, puerperium	33.379666	0.497	-156.011365	-1.642	-19.574644	-0.148
Skin disease	18.737733	2.181	17.885262	1.629	28.005282	1.995
Musculoskeletal disease	9.226935	1.274	0.625988	0.066	36.566646	3.092
Congenital anomaly	16.151346	0.643	19.448245	0.572	-42.883466	-0.976
Perinatal origin	47.763191	0.499	346.235503	3.133	557.86904	3.833
Inn-defined condition	50.489357	7.236	61.175216	6.564	96.633724	8.301
Hypertension	-20.373611	-2.233	-36.9876	-3.117	-61.655042	-4.14
Stroke	197.170535	14.869	253.268578	14.802	293.343352	13.943
Mental problems:						
Mental disorder	132.212542	4.988	153.003556	4.605	53.747316	1.247
Senility	54.196297	1.809	62.186176	1.614	290.685785	5.839
Alcoholic psychosis	12.272059	0.089	-51.883602	-0.288	869.493899	3.522
Drug psychosis	974.852226	7.83	-234.368287	-1.414		
Transient organic	245.252211	4.867	-45.935171	-0.677	183.375273	2.315
Other organic psychosis	50.873474	0.955	309.523859	4.147	186.222066	2.163
Schizophrenia	-102.872583	-1.577	-98.790159	-1.169	102.7707	0.924
Affective psychosis	-42.615189	-1.105	-150.66427	-3.032	130.210924	2.064
Paranoid state	278.593975	1.66	3.857962	0.017	-460.204347	-2.25
Other nonorganic	35.875874	1.06	74.272816	1.703	185.221746	3.497
Psychoses of childhood			-177.431698	-0.254	-870.874267	-1.384
Neurotic disorder	-118.425107	-4.049	-95.934967	-2.582	-92.517312	-1.888
Personality disorder	19.518415	0.117	-7.376201	-0.033	367.55639	1.242
Sexual disorder	-140.495285	-1.253	-170.464693	-1.508	27.102517	0.152
Alcohol dependence	-173.495567	-1.465	-170.025447	-1.095	-191.699999	-1.058

Table 9-4b: Skilled nursing payments by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-165.689324	-0.991	-229.663556	-0.839	-521.888197	-1.018
Nondependent drug abuse	-23.6408	-0.222	-173.30825	-1.538	19.755071	0.119
Psychophysiology	-41.56261	-0.382	-238.208035	-1.316	-209.004542	-0.846
Special syndrome	-126.108841	-2.17	-267.61266	-3.576	12.672853	0.143
Acute reaction to stress	-175.410582	-2.019	-233.996276	-1.831	-236.514832	-1.121
Adjustment reaction	-167.105282	-2.544	86.189185	1.084	414.318173	4.308
Nonpsychotic brain prob.	292.337796	7.368	228.070433	4.142	387.716428	4.939
Depression	-118.8877	-3.226	-69.457175	-1.574	-99.301822	-1.646
Conduct disturbance	-162.430061	-0.814	-338.881501	-1.362	-105.879179	-0.517
Emotional disturbance	-214.563985	-0.408				
Hyperkinetic syndrome	-295.189366	-0.974	-167.593044	-0.24	-427.294518	-0.683
Development delay	-129.16067	-0.246	-513.393757	-1.039	-41.700909	-0.047
Other psychic factors	-186.224918	-0.865	4275.30053	13.598	-142.969646	-0.278
Physician:						
GP/internist/OBGYN	-1.277946	-0.15	-2.812607	-0.21	-0.136847	-0.008
Neurologist	69.188772	4.646	129.470462	6.478	62.507848	2.494
Psychiatrist	-9.796	-0.348	113.961793	3.201	16.12296	0.361
Geriatrics specialist	2177.505928	15.989	142.669195	2.187	89.460397	1.391
Psychologist	-57.062434	-0.373	-393.680443	-1.256	-434.948457	-0.693
Clinical psychologist	-184.670781	-1.394	105.173759	1.845	370.722782	5.698
Other specialist	-0.840512	-0.061	2.193106	0.122	0.695388	0.033
R-squared		0.058		0.054		0.055
F-statistic		29.159		27.255		29.502
Sample size		26496		26644		27701

Boldface = Significant

Table 9-5a: Home health charges by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-3866.089502	-15.582	-4909.541412	-16.196	-6123.768446	-18.057
Black(=1)	238.901466	3.042	382.107522	3.995	617.139149	5.657
Male(=1)	-156.373562	-3.514	-228.196815	-4.181	-216.121265	-3.503
Rural count	-149.668781	-3.065	-316.197655	-5.29	-330.258653	-4.866
Age in year	56.46246	18.893	72.392641	19.849	90.523979	21.987
PERCAP91	-0.037646	-7.514	-0.037102	-6.075	-0.04517	-6.51
Physical problems:						
Infectious disease	194.311675	2.571	399.318946	4.135	337.371221	3.103
Neoplasms	75.320464	1.265	-44.965825	-0.63	-52.732122	-0.645
Metabolic disease	426.369346	8.501	569.652832	9.399	650.382283	9.51
Blood disease	327.861729	3.634	260.151159	2.429	693.380115	5.737
Nervous disorder	-244.538157	-5.534	-283.295586	-5.266	-240.986398	-3.929
Circulatory disease	393.813324	6.959	526.972846	7.584	533.39079	6.661
Respiratory disease	-21.943327	-0.375	-147.861714	-2.016	-114.679413	-1.398
Digestive disease	243.216158	4.398	285.016967	4.313	321.878116	4.213
Genitourinary disease	252.299878	5.127	309.33485	5.268	313.131308	4.666
Pregnancy, puerperium	461.583769	1.054	480.324165	0.841	1580.840927	2.19
Skin disease	220.377622	3.935	259.50032	3.933	363.390949	4.73
Musculoskeletal disease	74.066561	1.569	153.07651	2.687	263.3039	4.067
Congenital anomaly	192.108036	1.173	-56.899727	-0.279	203.902998	0.848
Perinatal origin	1021.372623	1.636	389.031656	0.586	1144.428479	1.436
Inn-defined condition	376.528811	8.278	549.109138	9.806	726.612969	11.401
Hypertension	-236.33384	-3.974	-346.253641	-4.857	-409.403616	-5.022
Stroke	634.52411	7.34	1261.370398	12.269	1437.028119	12.477
Mental problems:						
Mental disorder	-124.32753	-0.719	-3.255452	-0.016	89.650309	0.38
Senility	51.661616	0.265	-4.954248	-0.021	-220.059688	-0.807
Alcoholic psychosis	676.369579	0.749	-620.868333	-0.573	-979.98643	-0.725
Drug psychosis	442.297229	0.545	1839.895879	1.848		
Transient organic	-33.115483	-0.101	-281.819206	-0.692	1889.130562	4.356
Other organic psychosis	147.905849	0.426	-749.200762	-1.671	-661.450915	-1.404
Schizophrenia	2612.085741	6.143	829.910694	1.634	2136.871128	3.51
Affective psychosis	490.319688	1.949	311.302402	1.043	265.105602	0.768
Paranoid state	-365.449226	-0.334	-428.883435	-0.318	1319.510778	1.179
Other nonorganic	877.236642	3.975	522.497987	1.994	985.640701	3.399
Psychoses of childhood			752.843663	0.18	-3155.366864	-0.916
Neurotic disorder	145.746137	0.764	-0.160924	-0.001	560.303893	2.088
Personality disorder	80.823629	0.075	827.387162	0.621	2469.892733	1.524
Sexual disorder	-328.269968	-0.449	-677.745448	-0.998	-803.694834	-0.825
Alcohol dependence	-277.983628	-0.36	-312.624055	-0.335	-835.131133	-0.842

Table 9-5a: Home health charges by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-1022.699693	-0.939	-1584.504393	-0.964	-225.603095	-0.08
Nondependent drug abuse	376.571732	0.543	439.546087	0.649	-103.642696	-0.114
Psychophysiologic	467.251927	0.658	1046.029984	0.962	1957.712542	1.448
Special syndrome	457.267732	1.207	-951.710257	-2.117	-642.856085	-1.322
Acute reaction to stress	420.501495	0.742	-1073.204689	-1.398	1433.118902	1.241
Adjustment reaction	-557.671702	-1.302	264.992235	0.554	1011.384112	1.921
Nonpsychotic brain prob.	-63.666789	-0.246	-986.216619	-2.981	-801.423076	-1.865
Depression	-203.000013	-0.845	182.8967	0.69	640.575478	1.94
Conduct disturbance	-949.593032	-0.73	5.580461	0.004	-1116.447408	-0.996
Emotional disturbance	-1072.874424	-0.313				
Hyperkinetic syndrome	2181.154527	1.104	-682.322329	-0.163	-2275.175993	-0.664
Development delay	-499.240706	-0.146	-2388.912244	-0.805	-1239.702728	-0.256
Other psychic factors	-1045.805055	-0.745	1438.742235	0.762	-479.996879	-0.17
Physician:						
GP/Internist/OBGYN	108.019014	1.948	-59.177098	-0.735	-113.722152	-1.248
Neurologist	513.578681	5.29	718.782188	5.985	286.241613	2.086
Psychiatrist	112.251158	0.612	319.514903	1.494	-273.254233	-1.118
Geriatrics specialist	-1013.913942	-1.142	-278.705943	-0.711	-527.308709	-1.498
Psychologist	-972.716181	-0.976	1386.70932	0.736	-1270.666583	-0.37
Clinical psychologist	-1274.455827	-1.476	-128.44321	-0.375	-666.675581	-1.872
Other specialist	292.466359	3.235	361.82433	3.35	367.612909	3.197
R-squared		0.057		0.067		0.074
F-statistic		28.522		33.877		40.163
Sample size		26496		26644		27701

Boldface = Significant

Table 9-5b: Home health payments by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-2961.107867	-16.041	-3588.750203	-16.922	-4604.245753	-18.853
Black(=1)	249.638247	4.272	287.651504	4.299	438.583026	5.583
Male(=1)	-111.397817	-3.365	-150.70658	-3.947	-150.452991	-3.386
Rural count	-93.113389	-2.563	-197.776527	-4.729	-191.012911	-3.908
Age in year	42.83432	19.266	52.483507	20.569	67.339232	22.711
PERCAP91	-0.02656	-7.126	-0.025641	-6.001	-0.031706	-6.345
Physical problems:						
Infectious disease	97.607486	1.736	267.643944	3.961	216.604525	2.766
Neoplasms	42.974832	0.97	-31.32635	-0.628	-64.703588	-1.099
Metabolic disease	261.561629	7.009	380.124895	8.964	433.730856	8.807
Blood disease	190.102311	2.832	174.771107	2.332	435.9815	5.009
Nervous disorder	-154.126459	-4.688	-194.459902	-5.166	-173.766081	-3.934
Circulatory disease	294.474063	6.994	353.653273	7.275	351.228905	6.091
Respiratory disease	3.372379	0.078	-120.045848	-2.339	-90.927131	-1.539
Digestive disease	166.831028	4.055	192.286601	4.159	229.411916	4.169
Genitourinary disease	165.566938	4.522	204.421919	4.976	216.553628	4.481
Pregnancy, puerperium	490.393061	1.505	315.185038	0.789	1113.72088	2.142
Skin disease	158.611825	3.807	147.971044	3.206	215.436325	3.894
Musculoskeletal disease	57.928086	1.65	106.317581	2.667	175.524733	3.764
Congenital anomaly	129.580093	1.063	-5.043847	-0.035	121.712384	0.703
Perinatal origin	362.168599	0.78	345.988801	0.745	1082.464632	1.886
Inn-defined condition	247.217312	7.305	391.033384	9.981	492.203277	10.724
Hypertension	-178.16275	-4.026	-233.919915	-4.69	-282.485645	-4.811
Stroke	388.426953	6.04	807.618014	11.228	1062.833754	12.814
Mental problems:						
Mental disorder	-20.706873	-0.161	-44.991102	-0.322	109.870021	0.646
Senility	-62.85731	-0.433	-21.492974	-0.133	-234.112143	-1.193
Alcoholic psychosis	392.79722	0.585	-415.810083	-0.549	-669.395934	-0.688
Drug psychosis	280.410302	0.464	1516.325258	2.177		
Transient organic	-62.964283	-0.258	-224.81664	-0.789	1173.391813	3.757
Other organic psychosis	255.985127	0.991	-459.052915	-1.463	-467.062534	-1.376
Schizophrenia	1400.622964	4.427	591.676881	1.665	1478.321108	3.372
Affective psychosis	212.882602	1.138	180.227864	0.863	147.064922	0.591
Paranoid state	-296.230775	-0.364	-171.816458	-0.182	900.028719	1.116
Other nonorganic	536.829967	3.27	382.102076	2.084	607.626213	2.91
Psychoses of childhood			558.072039	0.19	-2159.51358	-0.871
Neurotic disorder	12.236966	0.086	41.306701	0.264	361.361452	1.87
Personality disorder	8.52445	0.011	420.480603	0.451	2258.26514	1.935
Sexual disorder	-300.840485	-0.553	-419.866442	-0.884	-600.093612	-0.855
Alcohol dependence	-330.596582	-0.576	-227.264296	-0.348	-617.4291	-0.865

Table 9-5b: Home health payments by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-760.793582	-0.939	-1076.515731	-0.936	-91.004552	-0.045
Nondependent drug abuse	155.023156	0.301	371.803661	0.785	-230.029137	-0.352
Psychophysiology	108.770151	0.206	736.082325	0.967	1305.392727	1.341
Special syndrome	197.551071	0.701	-643.308274	-2.045	-435.649893	-1.244
Acute reaction to stress	206.760213	0.491	-731.097326	-1.361	880.171728	1.058
Adjustment reaction	-427.057415	-1.34	156.575384	0.468	391.842011	1.033
Nonpsychotic brain prob.	-150.691735	-0.783	-615.361554	-2.659	-566.005304	-1.829
Depression	-112.63521	-0.63	143.04938	0.771	467.77587	1.967
Conduct disturbance	-765.233558	-0.79	353.256656	0.338	-788.708566	-0.977
Emotional disturbance	-1005.60479	-0.394				
Hyperkinetic syndrome	4542.873926	3.091	-447.096324	-0.153	-1568.575268	-0.636
Development delay	-487.477252	-0.192	-1596.938386	-0.769	-953.370127	-0.273
Other psychic factors	-759.880519	-0.728	731.087045	0.553	-246.866932	-0.122
Physician:						
GP/internist/OBGYN	82.871742	2.008	-42.278035	-0.751	-62.602467	-0.954
Neurologist	399.176679	5.527	501.513645	5.969	197.295991	1.997
Psychiatrist	134.530845	0.985	252.461477	1.687	-230.72563	-1.311
Geriatrics specialist	-638.46537	-0.967	-88.934641	-0.324	-326.50614	-1.288
Psychologist	-609.893631	-0.823	1051.627617	0.798	-704.671666	-0.285
Clinical psychologist	-870.000429	-1.354	-128.260926	-0.535	-575.638659	-2.244
Other specialist	221.201762	3.289	258.109491	3.416	280.952503	3.393
R-squared		0.052		0.064		0.071
F-statistic		25.645		32.702		38.246
Sample size		26496		26644		27701

Boldface = Significant

Table 9-6a: Hospice charges by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-4.214113	-0.149	-72.649018	-2.178	-73.5046	-1.751
Black(=1)	7.460954	0.834	36.326181	3.452	38.638217	2.861
Male(=1)	0.389231	0.077	-7.415014	-1.235	-13.293806	-1.74
Rural county	8.074124	1.452	-0.044911	-0.007	-2.363119	-0.281
Age in year	-0.037026	-0.109	0.5701	1.421	1.430963	2.807
Per capita income, county	0.000318	0.557	0.002931	4.361	0.002273	2.645
Physical Problems						
Infectious disease	4.126384	0.479	-0.004382	0	-10.09623	-0.75
Neoplasms	52.091054	7.68	63.154862	8.044	105.260986	10.403
Metabolic disease	-4.519276	-0.791	-4.541817	-0.681	-7.012656	-0.828
Blood disease	1.78825	0.174	-2.505433	-0.213	-12.111088	-0.809
Nervous disorder	-16.5579	-3.291	-15.590092	-2.633	-16.843375	-2.218
Circulatory disease	-5.099794	-0.791	-10.02446	-1.311	1.252186	0.126
Respiratory disease	4.683883	0.704	-6.064005	-0.751	-14.711682	-1.449
Digestive disease	8.832049	1.403	-1.254412	-0.173	4.211421	0.445
Genitourinary disease	-12.027095	-2.146	-8.742018	-1.353	-13.195766	-1.588
Pregnancy, puerperium	-20.082746	-0.403	-15.414226	-0.245	-10.913284	-0.122
Skin disease	-13.343312	-2.092	-16.336413	-2.25	0.217227	0.023
Musculoskeletal disease	-5.512017	-1.026	-17.405102	-2.776	-15.985818	-1.994
Congenital anomaly	36.196808	1.94	69.030094	3.071	-21.011027	-0.706
Perinatal origin	322.524146	4.537	-23.499645	-0.322	-13.990871	-0.142
Inn-defined condition	3.953359	0.763	-0.861726	-0.14	13.02049	1.65
Hypertension	-4.575967	-0.676	-11.680244	-1.489	-18.346118	-1.818
Stroke	17.677964	1.796	19.236485	1.7	-0.418082	-0.029
Mental Problems						
Any Mental disorder	13.832619	0.703	-16.437888	-0.748	-14.242847	-0.487
Senility	-25.491771	-1.146	9.930749	0.39	-16.708858	-0.495
Alcoholic psychosis	-22.123087	-0.215	-19.115905	-0.16	-28.075317	-0.168
Drug psychosis	-22.070742	-0.239	6.236236	0.057		
Transient organic	157.791914	4.218	-5.337878	-0.119	13.950421	0.26
Other organic psychosis	-32.905499	-0.832	-17.433417	-0.353	-10.170518	-0.174
Schizophrenia	-46.171179	-0.954	-0.041198	-0.001	-5.90056	-0.078
Affective psychosis	-47.227201	-1.649	-5.105845	-0.155	-4.169223	-0.098
Paranoid state	-48.830819	-0.392	-26.762733	-0.181	-16.868539	-0.122
Other nonorganic	-30.7006	-1.222	-9.682534	-0.336	6.316328	0.176
Psychoses of childhood			-56.437923	-0.122	17.032037	0.04
Neurotic disorder	-27.407331	-1.262	45.265365	1.842	11.706319	0.352
Personality disorder	-17.222352	-0.139	-2.311806	-0.016	-8.47285	-0.042
Sexual disorder	-27.714924	-0.333	1.519193	0.02	7.253816	0.06
Alcohol dependence	-54.699923	-0.622	-18.045393	-0.176	-12.497179	-0.102

Table 9-6a: Hospice charges by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-32.314871	-0.26	21.73259	0.12	50.553121	0.146
Nondependent drug abuse	-25.380496	-0.322	-2.007367	-0.027	0.167198	0.001
Psychophysiology	-39.324705	-0.487	-4.773487	-0.04	-7.356623	-0.044
Special syndrome	-25.811877	-0.598	-0.64805	-0.013	-0.501927	-0.008
Acute reaction to stress	-10.368139	-0.161	5.669801	0.067	-14.024709	-0.098
Adjustment reaction	-24.598809	-0.504	-23.917784	-0.455	-11.434407	-0.175
Nonpsychotic brain prob.	-22.118638	-0.751	8.023784	0.22	16.242413	0.305
Depression	-20.405621	-0.746	-5.842169	-0.2	-1.184529	-0.029
Conduct disturbance	-27.079507	-0.183	-9.072824	-0.055	-20.439022	-0.147
Emotional disturbance	-45.742215	-0.117				
Hyperkinetic syndrome	-75.230152	-0.334	-9.522537	-0.021	49.254412	0.116
Development delay	-53.220132	-0.137	16.828272	0.052	-5.971202	-0.01
Other psychic factors	-27.297495	-0.171	-22.611878	-0.109	-17.925113	-0.051
Physician						
GP/internist/OBGYN	2.435893	0.386	8.678757	0.98	-47.921755	-4.246
Neurologist	9.273828	0.839	-4.356584	-0.33	9.322603	0.549
Psychiatrist	42.121492	2.016	-2.02467	-0.086	-1.639963	-0.054
Geriatrics specialist	-23.462042	-0.232	-13.038399	-0.302	-14.865992	-0.341
Psychologist	9.775857	0.086	-32.196823	-0.155	-43.330267	-0.102
Clinical psychologist	-20.43534	-0.208	74.934586	1.988	9.379804	0.213
Other specialist	11.135234	1.082	17.721743	1.491	5.642012	0.396
R-squared						
		0.006		0.006		0.007
F-statistic						
		2.826		2.631		3.354
Sample size						
		26496		26644		27701

Boldface = Significant

Table 9-6b: Hospice payments by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-4.951391	-0.177	-72.611106	-2.177	-73.507535	-1.751
Black(=1)	7.858327	0.886	36.332606	3.453	38.638634	2.861
Male(=1)	0.071004	0.014	-7.403839	-1.233	-13.293165	-1.74
Rural county	7.669563	1.391	-0.053428	-0.008	-2.362471	-0.281
Age in year	-0.026769	-0.079	0.569589	1.419	1.43099	2.807
Per capita income	0.000353	0.623	0.002931	4.361	0.002273	2.645
Physical Problems						
Infectious disease	4.294702	0.503	0.003131	0	-10.099147	-0.75
Neoplasms	51.167537	7.607	63.121726	8.041	105.261083	10.403
Metabolic disease	-4.305052	-0.76	-4.56168	-0.684	-7.011999	-0.828
Blood disease	2.075788	0.204	-2.493517	-0.212	-12.110502	-0.809
Nervous disorder	-16.282351	-3.263	-15.579675	-2.632	-16.842734	-2.218
Circulatory disease	-4.710412	-0.737	-10.022211	-1.311	1.251946	0.126
Respiratory disease	4.900537	0.742	-6.059075	-0.751	-14.711306	-1.449
Digestive disease	8.07818	1.294	-1.264396	-0.174	4.21194	0.445
Genitourinary disease	-11.694946	-2.104	-8.731454	-1.351	-13.19532	-1.588
Pregnancy, puerperium	-19.833585	-0.401	-15.411278	-0.245	-10.913048	-0.122
Skin disease	-13.110173	-2.073	-16.327937	-2.249	0.2176	0.023
Musculoskeletal disease	-5.278122	-0.99	-17.396612	-2.775	-15.985164	-1.994
Congenital anomaly	36.466456	1.971	69.03633	3.071	-21.010644	-0.705
Perinatal origin	322.796711	4.579	-23.485375	-0.321	-13.989222	-0.142
Inn-defined condition	3.634241	0.708	-0.86949	-0.141	13.020524	1.65
Hypertension	-4.641139	-0.691	-11.673281	-1.488	-18.34552	-1.818
Stroke	17.645537	1.808	19.199184	1.697	-0.41967	-0.029
Mental Problems						
Any Mental disorder	14.078509	0.721	-16.423779	-0.748	-14.238022	-0.487
Senility	-25.631788	-1.162	9.929695	0.39	-16.701885	-0.495
Alcoholic psychosis	-22.060218	-0.216	-19.119652	-0.16	-28.072003	-0.168
Drug psychosis	-22.21541	-0.242	6.22676	0.057	13.959445	0.26
Transient organic	157.74657	4.252	-5.339572	-0.119		
Other organic psychosis	-32.919937	-0.84	-17.435148	-0.353	-10.161514	-0.174
Schizophrenia	-46.24545	-0.963	-0.04947	-0.001	-5.893859	-0.078
Affective psychosis	-47.332135	-1.666	-5.112918	-0.156	-4.156528	-0.097
Paranoid state	-48.786554	-0.395	-26.775112	-0.181	-16.859555	-0.122
Other nonorganic	-30.798925	-1.236	-9.68238	-0.336	6.298028	0.175
Psychoses of childhood			-56.460691	-0.122	17.035711	0.04
Neurotic disorder	-27.388537	-1.272	45.25899	1.842	11.695846	0.352
Personality disorder	-16.978209	-0.139	-2.315466	-0.016	-8.458731	-0.042
Sexual disorder	-27.293665	-0.331	1.507755	0.02	7.250433	0.06

Table 9-6b: Hospice payments by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Alcohol dependence	-54.195924	-0.622	-18.049895	-0.176	-12.501641	-0.102
Drug dependence	-32.285298	-0.262	21.74366	0.12	50.560599	0.146
Nondependent drug abu.	-25.034782	-0.32	-2.018898	-0.027	0.164966	0.001
Psychophysiologic	-39.059559	-0.487	-4.767524	-0.04	-7.357697	-0.044
Special syndrome	-25.882089	-0.605	-0.655832	-0.013	-0.502818	-0.008
Acute reaction to stress	-10.493662	-0.164	5.658772	0.067	-14.021645	-0.098
Adjustment reaction	-24.691518	-0.511	-23.918963	-0.455	-11.427057	-0.175
Nonpsychotic brain prob.	-22.319375	-0.764	8.024756	0.22	16.244063	0.305
Depression	-20.428371	-0.753	-5.846482	-0.2	-1.182466	-0.029
Conduct disturbance	-27.666101	-0.188	-9.079839	-0.055	-20.428105	-0.147
Emotional disturbance	-45.196012	-0.117				
Hyperkinetic syndrome	-75.421188	-0.338	-9.537938	-0.021	49.24591	0.116
Development delay	-53.216554	-0.138	16.840505	0.052	-5.976781	-0.01
Other psychic factors	-27.503911	-0.174	-22.644049	-0.109	-17.910076	-0.051
Physician						
GP/internist/OBGYN	2.135233	0.341	8.677186	0.98	-47.922107	-4.246
Neurologist	9.460585	0.863	-4.340754	-0.328	9.319969	0.549
Psychiatrist	42.123037	2.033	-2.024304	-0.086	-1.654275	-0.055
Geriatrics specialist	-23.527145	-0.235	-13.029689	-0.302	-14.865745	-0.341
Psychologist	10.128538	0.09	-32.182625	-0.155	-43.319549	-0.102
Clinical psychologist	-20.038142	-0.206	74.935693	1.988	9.347146	0.212
Other specialist	10.836043	1.061	17.720675	1.491	5.641513	0.396
R-squared						
		0.006		0.006		0.007
F-statistic						
		2.803		2.63		3.354
Sample size						
		26496		26644		27701

Boldface = Significant

Table 9-7a: Physician charges by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-818.555406	-2.763	-544.342848	-2.568	-536.768609	-4.667
Black(=1)	122.428518	1.305	173.914574	2.601	237.452619	6.418
Male(=1)	136.893391	2.577	142.33719	3.729	171.945708	8.218
Rural county	-76.516985	-1.312	-24.356272	-0.583	32.676159	1.42
Age in year	2.885166	0.809	-1.522144	-0.597	0.467617	0.335
Per capita income, county	0.001956	0.327	0.009847	2.306	-0.002074	-0.881
Physical problems:						
Infectious disease	560.068665	6.207	733.531572	10.862	552.35655	14.979
Neoplasms	814.062116	11.447	964.020902	19.323	833.032278	30.055
Metabolic disease	501.81281	8.38	459.286358	10.837	307.391487	13.254
Blood disease	771.835727	7.165	893.609734	11.932	772.560814	18.847
Nervous disorder	141.997712	2.692	272.142223	7.234	217.700646	10.466
Circulatory disease	760.024091	11.248	683.616274	14.071	671.443807	24.725
Respiratory disease	38.511572	0.552	22.87432	0.446	87.070961	3.13
Digestive disease	626.174462	9.484	692.927338	14.997	559.58982	21.595
Genitourinary disease	529.119537	9.005	401.943598	9.789	292.858218	12.868
Pregnancy, puerperium	77.212226	0.148	-23.619869	-0.059	482.085433	1.969
Skin disease	121.310189	1.814	32.491547	0.704	102.984369	3.952
Musculoskeletal disease	263.73712	4.68	183.662878	4.61	229.938828	10.471
Congenital anomaly	661.807271	3.383	1156.339907	8.094	614.95299	7.538
Perinatal origin	108.193138	0.145	579.652454	1.249	435.618916	1.612
Inn-defined condition	702.240958	12.931	660.452202	16.867	639.580237	29.591
Hypertension	-391.869592	-5.518	-346.96918	-6.96	-376.036767	-13.6
Stroke	687.490191	6.661	448.915425	6.244	519.155407	13.291
Mental problems:						
Mental disorder	30.029413	0.146	131.656498	0.943	64.971716	0.812
Senility	317.596382	1.362	163.480013	1.01	265.022255	2.867
Alcoholic psychosis	464.917352	0.431	-327.34138	-0.432	488.373699	1.065
Drug psychosis	-261.683341	-0.27	-409.25815	-0.588		
Transient organic	49.539976	0.126	203.132021	0.713	243.833225	1.658
Other organic psychosis	455.848226	1.1	198.19341	0.632	838.831508	5.248
Schizophrenia	-65.676636	-0.129	-5.517311	-0.016	357.859885	1.733
Affective psychosis	521.529996	1.737	499.475012	2.392	198.395308	1.694
Paranoid state	1535.09675	1.175	130.17415	0.138	150.920857	0.398
Other nonorganic	74.040979	0.281	455.691815	2.487	368.770147	3.75
Psychoses of childhood			-1046.603917	-0.357	771.060459	0.66
Neurotic disorder	-210.43198	-0.924	-146.644178	-0.939	-21.777846	-0.239
Personality disorder	417.576006	0.322	-57.806568	-0.062	11.514546	0.021
Sexual disorder	-461.342798	-0.528	-549.818813	-1.158	-139.39788	-0.422
Alcohol dependence	-393.391468	-0.427	-31.660524	-0.049	-122.683737	-0.365

Table 9-7a: Physician charges by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-1254.242656	-0.964	2508.200138	2.182	-516.698156	-0.543
Nondependent drug abuse	494.693631	0.598	112.852282	0.238	61.147686	0.199
Psychophysiology	-397.825052	-0.47	-29.20095	-0.038	898.555021	1.96
Special syndrome	-10.179016	-0.023	-46.937995	-0.149	13.894844	0.084
Acute reaction to stress	-615.67797	-0.91	-146.757781	-0.273	456.819757	1.166
Adjustment reaction	314.460817	0.615	-70.729951	-0.212	456.997217	2.559
Nonpsychotic brain prob.	230.112045	0.745	282.075662	1.219	1033.452778	7.091
Depression	-249.624822	-0.87	-181.47396	-0.979	161.217025	1.44
Conduct disturbance	-910.412976	-0.586	-204.417036	-0.195	418.320265	1.1
Emotional disturbance	-1656.097475	-0.404				
Hyperkinetic syndrome	550.326781	0.233	105.663531	0.036	270.041275	0.232
Development delay	-689.902018	-0.169	-1600.194659	-0.771	-379.106347	-0.231
Other psychic factors	-1059.002855	-0.632	705.506536	0.534	403.944288	0.423
Physician:						
GP/internist/OBGYN	138.071547	2.085	-4.00934	-0.071	10.40882	0.337
Neurologist	1073.974303	9.266	1158.350034	13.794	785.110545	16.871
Psychiatrist	492.714333	2.249	451.722942	3.02	389.157658	4.696
Geriatrics specialist	1229.873614	1.16	423.775715	1.546	611.030549	5.117
Psychologist	237.414584	0.2	-1744.733622	-1.325	-989.487599	-0.849
Clinical psychologist	338.099405	0.328	1146.697185	4.787	1083.617178	8.972
Other specialist	303.062918	2.808	188.898281	2.501	227.27994	5.829
R-squared		0.002		0.135		0.288
F-statistic		8.286		74.103		203.193
Sample size		26497		26644		27701

Boldface = Significant

Table 9-7b: Physician payments by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-303.138341	-0.114	-4527.669859	-1.47	-476.879389	-5.152
Black(=1)	-15.959445	-0.019	1355.623127	1.395	189.424754	6.362
Male(=1)	807.030274	1.691	-140.268385	-0.253	134.24392	7.973
Rural county	-379.700126	-0.725	-1264.436283	-2.081	27.100028	1.463
Age in year	2.726271	0.085	22.049866	0.595	0.653669	0.582
Per capita income, county	-0.060515	-1.126	0.257873	4.154	-0.001876	-0.99
Physical problems:						
Infectious disease	-174.027151	-0.215	2491.631946	2.538	442.441118	14.909
Neoplasms	2148.565105	3.364	1221.147831	1.684	669.579169	30.019
Metabolic disease	1292.875239	2.404	1461.859766	2.373	254.850953	13.655
Blood disease	-343.643305	-0.355	456.028401	0.419	633.776556	19.213
Nervous disorder	-841.449921	-1.776	517.487232	0.946	168.884899	10.089
Circulatory disease	796.348488	1.312	1250.145062	1.77	539.112895	24.669
Respiratory disease	-418.173862	-0.667	164.845467	0.221	69.965943	3.126
Digestive disease	705.716964	1.19	1455.36336	2.167	448.57967	21.511
Genitourinary disease	1264.290741	2.396	1688.12336	2.829	241.800815	13.202
Pregnancy, puerperium	-536.563116	-0.114	-1331.48149	-0.229	399.265958	2.027
Skin disease	-13.7496	-0.023	-1075.899776	-1.604	81.814027	3.902
Musculoskeletal disease	832.254477	1.644	-273.047611	-0.472	183.072602	10.36
Congenital anomaly	5619.279588	3.199	-383.002186	-0.184	499.778144	7.613
Perinatal origin	-526.802582	-0.079	-569.959979	-0.084	348.885619	1.604
Inn-defined condition	-10.601511	-0.022	1009.844092	1.774	514.598478	29.586
Hypertension	228.56878	0.358	69.849981	0.096	-300.388532	-13.5
Stroke	-662.512741	-0.715	-1872.511477	-1.792	419.010395	13.33
Mental problems:						
Mental disorder	-280.420346	-0.151	-318.522479	-0.157	49.727951	0.772
Senility	483.965575	0.231	186.535185	0.079	195.984532	2.635
Alcoholic psychosis	344.467847	0.036	-460.868778	-0.042	384.159179	1.041
Drug psychosis	-445.043305	-0.051	-2098.857087	-0.207		
Transient organic	-768.976806	-0.218	-522.45718	-0.126	216.788746	1.832
Other organic psychosis	-110.123576	-0.03	51.500682	0.011	662.297938	5.149
Schizophrenia	317.123769	0.07	826.323733	0.16	250.236508	1.506
Affective psychosis	-14.810412	-0.005	-410.008111	-0.135	133.318821	1.415
Paranoid state	340.873698	0.029	292.8842	0.021	0.500226	0.002
Other nonorganic	-347.454887	-0.147	-907.12203	-0.341	293.34067	3.707
Psychoses of childhood			-7587.636642	-0.178	-151.602867	-0.161
Neurotic disorder	-317.91699	-0.155	-458.305543	-0.202	-19.702486	-0.269
Personality disorder	374.728732	0.032	-861.574481	-0.064	29.733152	0.067
Sexual disorder	-1110.986668	-0.142	-1167.625549	-0.169	-104.423811	-0.393
Alcohol dependence	-1325.343667	-0.16	1076.152821	0.113	-99.216384	-0.367

Table 9-7b: Physician payments by year, 1991-1993, Cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-1239.604833	-0.106	-1538.409867	-0.092	-386.113162	-0.504
Nondependent drug abuse	194.092112	0.026	150.650203	0.022	54.231795	0.219
Psychophysiologic	-1155.581454	-0.152	-302.169219	-0.027	749.666515	2.032
Special syndrome	-362.958114	-0.089	-1170.191144	-0.256	-7.377354	-0.056
Acute reaction to stress	-885.084471	-0.146	-782.112176	-0.1	334.383163	1.061
Adjustment reaction	208.898907	0.045	-380.697905	-0.078	381.350182	2.654
Nonpsychotic brain prob.	648.150484	0.234	-140.380752	-0.042	814.32095	6.944
Depression	-481.671026	-0.187	-494.058883	-0.183	128.700479	1.428
Conduct disturbance	-616.623757	-0.044	-276.282582	-0.018	329.458415	1.076
Emotional disturbance	113.546017	0.003				
Hyperkinetic syndrome	814.291621	0.038	272.590979	0.006	180.44118	0.193
Development delay	1439.425664	0.039	-2594.874772	-0.086	-250.650264	-0.19
Other psychic factors	-912.954516	-0.061	-1280.775925	-0.067	313.874262	0.408
Physician:						
GP/internist/OBGYN	20.000683	0.034	-589.495032	-0.721	-1.76195	-0.071
Neurologist	4752.040953	4.565	6432.239609	5.27	638.130233	17.04
Psychiatrist	211.173593	0.107	-291.324949	-0.134	295.458507	4.43
Geriatrics specialist	1058.152671	0.111	-1146.489398	-0.288	495.606794	5.157
Psychologist	500.629215	0.047	-1521.639589	-0.08	-724.335921	-0.773
Clinical psychologist	-529.042886	-0.057	322.055008	0.092	779.649287	8.021
Other specialist	475.593879	0.491	-600.439929	-0.547	169.805199	5.411
R-squared						
		0.074		0.004		0.286
F-statistic						
		37.878		1.929		201.215
Sample size						
		26496		26644		27701

Boldface = Significant

Table 9-8a: Inpatient charges by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-3919.111164	-4.462	-2633.968233	-2.788	-2057.229951	-2.423
Black(=1)	851.528406	3.062	455.722086	1.529	1149.06477	4.206
Male(=1)	1253.843736	7.96	1300.839869	7.647	1206.015692	7.806
Rural county	806.631292	4.666	639.367525	3.432	577.194745	3.396
Age in year	5.850621	0.553	2.694706	0.237	-1.200311	-0.116
Per capita income, county	-0.021397	-1.206	-0.037782	-1.985	-0.061666	-3.549
Physical Problems						
Infectious disease	3245.057594	12.129	4874.567712	16.196	4438.719708	16.302
Neoplasms	1845.456381	8.752	2252.325258	10.129	1918.955282	9.376
Metabolic disease	1789.604806	10.079	1830.259263	9.689	1546.048825	9.028
Blood disease	4187.964498	13.112	4761.690023	14.265	4285.000513	14.158
Nervous disorder	-1138.237528	-7.277	-954.451918	-5.692	-1030.28214	-6.708
Circulatory disease	3561.967217	17.779	3697.606986	17.076	3724.412094	18.574
Respiratory disease	-31.899055	-0.154	-482.217249	-2.109	-280.660189	-1.366
Digestive disease	3265.265446	16.68	3862.520059	18.756	3223.964882	16.85
Genitourinary disease	1281.710211	7.357	1227.289047	6.706	1008.58005	6.002
Pregnancy, puerperium	2274.601006	1.467	847.269724	0.476	5269.3002	2.915
Skin disease	42.651769	0.215	-103.217531	-0.502	-12.086942	-0.063
Musculoskeletal disease	66.618939	0.399	84.425724	0.475	187.83467	1.158
Congenital anomaly	3707.041378	6.392	6718.962884	10.553	2660.302089	4.416
Perinatal origin	4926.820314	2.229	7323.853871	3.539	6248.016953	3.131
Inn-defined condition	3176.446846	19.727	3081.114773	17.654	3049.325336	19.107
Hypertension	-2427.852704	-11.531	-2188.415197	-9.85	-2419.716919	-11.852
Stroke	3584.606426	11.714	3254.831475	10.158	2670.420094	9.259
Mental problem:						
Any Mental disorder	739.731969	1.209	762.030181	1.225	15.706756	0.027
Senility	615.602707	0.89	-38.449197	-0.053	-1027.854662	-1.506
Alcoholic psychosis	4381.886367	1.371	4046.887216	1.199	2032.722165	0.601
Drug psychosis	3729.040855	1.298	-3019.927006	-0.973		
Transient organic	3441.416922	2.959	4668.461013	3.676	5819.534997	5.359
Other organic psychosis	6275.447404	5.107	2956.691369	2.115	1077.11207	0.913
Schizophrenia	-120.306452	-0.08	-534.2773	-0.337	2632.769368	1.727
Affective psychosis	407.692493	0.458	2317.683443	2.491	1601.391735	1.852
Paranoid state	8915.784993	2.301	-4790.46045	-1.141	2935.388384	1.047
Other nonorganic	859.206364	1.1	1614.562347	1.977	2463.276192	3.392
Psychoses of childhood			-777.413191	-0.059	-7320.889339	-0.849
Neurotic disorder	-359.792705	-0.533	-901.962749	-1.296	-732.374059	-1.09
Personality disorder	8195.782831	2.134	9057.643677	2.181	1767.042287	0.435
Sexual disorder	734.858645	0.284	-3180.781482	-1.503	248.46555	0.102
Alcohol dependence	6093.777293	2.23	3740.873418	1.286	-1004.178472	-0.404

Table 9-8a: Inpatient charges by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-1380.764278	-0.358	33568	6.552	8125.371913	1.157
Nondependent drug abuse	-2581.541462	-1.052	1548.358825	0.734	-1125.887844	-0.496
Psychophysiologic	-1363.383464	-0.543	3478.479263	1.026	7994.641389	2.361
Special syndrome	-2782.592792	-2.075	-2765.223999	-1.973	-154.585432	-0.127
Acute reaction to stress	-2219.483593	-1.107	-979.76754	-0.409	2811.381827	0.972
Adjustment reaction	510.969293	0.337	-1668.757354	-1.12	1845.520178	1.4
Nonpsychotic brain prob.	-281.876254	-0.308	-951.505849	-0.923	3739.822794	3.475
Depression	-1268.980603	-1.492	-1836.760136	-2.223	-489.527761	-0.592
Conduct disturbance	-6998.698033	-1.519	-2668.726791	-0.573	5251.14734	1.87
Emotional disturbance	-15489	-1.275				
Hyperkinetic syndrome	-436.878059	-0.062	3150.612789	0.241	5855.674486	0.683
Development delay	-4725.448875	-0.39	-11233	-1.214	-2225.264562	-0.184
Other psychic factors	-6483.00668	-1.305	17285	2.936	-4551.675169	-0.646
Physician:						
GP/internist/OBGYN	695.256776	3.541	-461.457993	-1.84	-135.223779	-0.592
Neurologist	7548.403813	21.964	8526.376027	22.78	7344.160276	21.374
Psychiatrist	4233.513054	6.517	2881.464697	4.323	2880.24388	4.707
Geriatrics specialist	1979.868387	0.63	1735.097436	1.42	3519.656294	3.992
Psychologist	1123.946249	0.319	-11383	-1.94	-5705.226109	-0.663
Clinical psychologist	1019.44955	0.334	9430.741286	8.833	4572.300672	5.127
Other specialist	720.579286	2.252	425.356575	1.264	433.78177	1.507
R-squared		0.162		0.165		0.16
F-statistic		90.909		93.453		92.327
Sample size		26496		26644		27701

Boldface = Significant

Table 9-8b: Inpatient payments by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-1696.501678	-5.317	-1430.991258	-3.935	-1645.710457	-4.502
Black(=1)	215.011466	2.129	198.409206	1.729	484.364468	4.12
Male(=1)	465.356255	8.133	501.24198	7.655	536.262537	8.065
Rural county	263.681193	4.199	194.278451	2.709	267.31093	3.654
Age in year	5.212843	1.357	4.230605	0.967	8.976711	2.023
Per capita income, county	-0.010973	-1.703	-0.014695	-2.006	-0.034996	-4.679
Physical problems:						
Infectious disease	1186.544324	12.209	1589.990775	13.724	1874.216314	15.992
Neoplasms	824.094865	10.76	1005.142169	11.743	923.229804	10.481
Metabolic disease	621.664918	9.639	702.624775	9.663	644.245267	8.74
Blood disease	1385.557037	11.942	1759.121491	13.691	1526.699988	11.719
Nervous disorder	-406.988909	-7.163	-372.052462	-5.764	-428.367965	-6.48
Circulatory disease	1448.867924	19.91	1639.79027	19.673	1658.906429	19.222
Respiratory disease	19.958165	0.265	-163.491123	-1.858	-83.120542	-0.94
Digestive disease	1212.773522	17.055	1479.331833	18.662	1404.535361	17.055
Genitourinary disease	450.75888	7.123	396.210036	5.625	390.656705	5.401
Pregnancy, puerperium	852.896129	1.515	492.491619	0.719	2230.819692	2.867
Skin disease	-2.410905	-0.033	-65.382007	-0.826	4.414472	0.053
Musculoskeletal disease	125.991743	2.076	151.130181	2.211	78.359612	1.123
Congenital anomaly	1433.368729	6.804	2524.716755	10.301	1153.728439	4.45
Perinatal origin	2460.409147	3.065	2877.292864	3.612	4064.781034	4.733
Inn-defined condition	1325.071705	22.655	1523.570471	22.679	1502.158956	21.869
Hypertension	-960.032097	-12.553	-1012.068954	-11.834	-1074.369429	-12.227
Stroke	1612.244763	14.504	1749.059433	14.181	1561.604891	12.58
Mental problems:						
Mental disorder	198.958987	0.895	229.519853	0.958	-418.090833	-1.643
Senility	267.177613	1.064	178.365288	0.642	208.57308	0.71
Alcoholic psychosis	1809.437541	1.559	2982.378237	2.296	1595.301205	1.095
Drug psychosis	698.078601	0.669	-1118.227042	-0.936		
Transient organic	1228.179105	2.907	1834.06463	3.752	1353.921671	2.897
Other organic psychosis	1872.112655	4.194	1406.06388	2.614	320.261362	0.631
Schizophrenia	236.475967	0.432	63.852215	0.105	2452.737433	3.738
Affective psychosis	-258.225433	-0.798	680.252121	1.899	1003.414458	2.696
Paranoid state	4753.082787	3.378	-1966.583789	-1.217	-1339.512916	-1.11
Other nonorganic	676.01158	2.382	1021.686786	3.25	1213.973172	3.884
Psychoses of childhood			-664.913803	-0.132	-3908.122031	-1.053
Neurotic disorder	103.171332	0.421	-382.115504	-1.427	-42.090072	-0.146
Personality disorder	1348.12395	0.966	2426.830223	1.518	2515.875095	1.441
Sexual disorder	-577.529127	-0.614	-996.538793	-1.223	747.0899	0.711
Alcohol dependence	2113.801089	2.13	1277.167369	1.141	551.887468	0.516

Table 9-8b: Inpatient payments by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-744.428982	-0.531	10820	5.486	4353.276674	1.44
Nondependent drug abuse	-1133.648403	-1.272	914.49938	1.126	-91.99347	-0.094
Psychophysiology	54.493135	0.06	581.299605	0.446	4034.627152	2.769
Special syndrome	-660.519629	-1.356	-1968.13626	-3.649	-162.982327	-0.311
Acute reaction to stress	-1016.992811	-1.396	-108.322514	-0.118	762.470684	0.613
Adjustment reaction	356.991795	0.648	-183.605353	-0.32	1391.713162	2.452
Nonpsychotic brain prob.	200.967712	0.604	-258.740586	-0.652	1943.533423	4.196
Depression	-231.917585	-0.751	-621.344322	-1.954	49.745629	0.14
Conduct disturbance	-2859.177595	-1.708	540.364521	0.301	2171.517283	1.797
Emotional disturbance	-5464.487976	-1.238				
Hyperkinetic syndrome	-1072.579729	-0.422	1123.076751	0.223	3626.356101	0.982
Development delay	-2098.596859	-0.477	-4455.341268	-1.251	-655.111633	-0.126
Other psychic factors	-2781.264383	-1.542	12797	5.647	-1706.749008	-0.562
Physician:						
GP/Internist/OBGYN	267.273815	3.748	-65.968821	-0.683	43.699585	0.445
Neurologist	2544.877464	20.386	2876.452233	19.965	2984.720828	20.182
Psychiatrist	1754.513589	7.436	945.072936	3.683	990.746658	3.762
Geriatrics specialist	624.959583	0.547	485.749701	1.033	1501.590881	3.957
Psychologist	540.721635	0.422	-5168.04463	-2.288	-2833.049189	-0.765
Clinical psychologist	868.514311	0.782	4289.284778	10.437	2337.546373	6.09
Other specialist	378.906342	3.26	361.14781	2.787	327.486776	2.643
R-squared		0.179		0.185		0.168
F-statistic		103.469		107.704		101.414
Sample size		24696		26644		27701

Boldface = Significant

Table 9-9a: Outpatient charges by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-89.321349	-0.778	304.391167	0.991	416.248511	2.9
Black(=1)	160.302646	4.412	34.227292	0.353	122.645815	2.656
Male(=1)	35.442865	1.722	109.933354	1.987	12.832395	0.491
Rural county	-106.34749	-4.708	23.083089	0.381	-16.163624	-0.563
Age in year	-0.419348	-0.303	-6.51874	-1.763	-6.056209	-3.475
Per capita income, county	-0.003494	-1.508	-0.008145	-1.316	-0.011995	-4.084
Physical problems:						
Infectious disease	186.896313	5.346	482.966421	4.934	199.936778	4.344
Neoplasms	546.905828	19.851	871.549927	12.052	757.953692	21.91
Metabolic disease	150.647358	6.493	79.080528	1.287	65.318113	2.256
Blood disease	213.697755	5.12	375.239907	3.457	370.761809	7.247
Nervous disorder	232.651564	11.383	191.522712	3.512	246.300532	9.487
Circulatory disease	244.087645	9.324	196.285535	2.787	353.150937	10.419
Respiratory disease	-6.983012	-0.258	-49.38055	-0.664	41.743921	1.202
Digestive disease	325.951305	12.743	488.176154	7.289	453.704285	14.028
Genitourinary disease	307.785611	13.522	276.643123	4.648	382.509551	13.466
Pregnancy, puerperium	-16.724092	-0.083	307.512056	0.531	-206.891445	-0.677
Skin disease	-41.404851	-1.598	-45.838817	-0.685	-9.74076	-0.3
Musculoskeletal disease	165.359003	7.575	122.566223	2.122	240.600366	8.779
Congenital anomaly	482.936882	6.373	676.489094	3.267	711.979702	6.993
Perinatal origin	-45.746183	-0.158	-43.086727	-0.064	405.167764	1.201
Inn-defined condition	386.934736	18.391	563.635153	9.93	510.829607	18.936
Hypertension	-147.98501	-5.379	-154.804724	-2.142	-197.904635	-5.735
Stroke	147.691925	3.694	287.814509	2.762	510.779965	10.477
Mental problems:						
Mental disorder	112.155465	1.403	71.771427	0.355	135.866854	1.36
Senility	-29.708095	-0.329	62.586556	0.267	100.55756	0.872
Alcoholic psychosis	-550.017754	-1.317	-300.450006	-0.274	-924.831016	-1.617
Drug psychosis	-334.862332	-0.892	-264.863931	-0.262		
Transient organic	-257.659531	-1.696	235.196257	0.569	55.41836	0.302
Other organic psychosis	-64.875049	-0.404	162.630134	0.358	441.95205	2.216
Schizophrenia	230.220329	1.171	13.280846	0.026	699.338201	2.714
Affective psychosis	-134.746001	-1.158	-41.341384	-0.137	-6.078777	-0.042
Paranoid state	-170.02655	-0.336	1378.11079	1.01	-640.08515	-1.351
Other nonorganic	75.06118	0.735	113.593126	0.428	178.583487	1.455
Psychoses of childhood			-624.643657	-0.147	-1822.380362	-1.25
Neurotic disorder	25.045249	0.284	93.32063	0.412	-29.402554	-0.259
Personality disorder	-317.975617	-0.634	-686.480556	-0.508	-447.051593	-0.652
Sexual disorder	-308.031403	-0.911	-493.326132	-0.717	-427.203601	-1.036
Alcohol dependence	-519.51845	-1.455	-149.535509	-0.158	-120.585145	-0.287

Table 9-9a: Outpatient charges by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-622.83624	-1.236	1545.098483	0.927	-1289.505597	-1.086
Nondependent drug abuse	589.010755	1.837	-334.004166	-0.487	112.291658	0.293
Psychophysiology	145.351359	0.443	42.026153	0.038	480.974557	0.84
Special syndrome	-26.645245	-0.152	120.434491	0.264	365.326676	1.775
Acute reaction to stress	-470.876363	-1.797	546.899096	0.703	-121.446841	-0.248
Adjustment reaction	370.86354	1.872	242.025288	0.5	175.046925	0.785
Nonpsychotic brain prob.	102.274412	0.855	232.525128	0.693	-143.991508	-0.792
Depression	-192.15667	-1.729	-21.306399	-0.079	32.760113	0.234
Conduct disturbance	-560.415385	-0.931	-794.158886	-0.524	1204.927878	2.538
Emotional disturbance	-645.755132	-0.407				
Hyperkinetic syndrome	-464.363222	-0.508	1762.242284	0.415	-1106.110029	-0.763
Development delay	-817.533301	-0.517	-144.007931	-0.048	-263.579709	-0.129
Other psychic factors	-371.662001	-0.573	796.698579	0.416	493.228087	0.414
Physician:						
GP/internist/OBGYN	-13.65962	-0.532	-4.283491	-0.053	-108.970912	-2.824
Neurologist	535.536493	11.926	265.377001	2.18	318.062191	5.476
Psychiatrist	117.713466	1.387	-72.933026	-0.336	173.441141	1.677
Geriatrics specialist	1296.872073	3.158	12.742466	0.032	37.182338	0.249
Psychologist	19.976492	0.043	2217.183581	1.162	-464.626474	-0.32
Clinical psychologist	-193.63387	-0.485	-312.233467	-0.899	376.434146	2.497
Other specialist	138.67905	3.317	207.840678	1.898	160.086144	3.289
R-squared						
		0.11		0.027		0.12
F-statistic						
		58.269		13.261		66.34
Sample size						
		26496		26644		27701

Boldface = Significant

Table 9-9b: Outpatient payments by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-89.321349	-0.778	304.391167	0.991	416.248511	2.9
Black(=1)	160.302646	4.412	34.227292	0.353	122.645815	2.656
Male(=1)	35.442865	1.722	109.933354	1.987	12.832395	0.491
Rural county	-106.34749	-4.708	23.083089	0.381	-16.163624	-0.563
Age in year	-0.419348	-0.303	-6.51874	-1.763	-6.056209	-3.475
Per capita income, county	-0.003494	-1.508	-0.008145	-1.316	-0.011995	-4.084
Physical problems:						
Infectious disease	186.896313	5.346	482.966421	4.934	199.936778	4.344
Neoplasms	546.905828	19.851	871.549927	12.052	757.953692	21.91
Metabolic disease	150.647358	6.493	79.080528	1.287	65.318113	2.256
Blood disease	213.697755	5.12	375.239907	3.457	370.761809	7.247
Nervous disorder	232.651564	11.383	191.522712	3.512	246.300532	9.487
Circulatory disease	244.087645	9.324	196.285535	2.787	353.150937	10.419
Respiratory disease	-6.983012	-0.258	-49.38055	-0.664	41.743921	1.202
Digestive disease	325.951305	12.743	488.176154	7.289	453.704285	14.028
Genitourinary disease	307.785611	13.522	276.643123	4.648	382.509551	13.466
Pregnancy, puerperium	-16.724092	-0.083	307.512056	0.531	-206.891445	-0.677
Skin disease	-41.404851	-1.598	-45.838817	-0.685	-9.74076	-0.3
Musculoskeletal disease	165.359003	7.575	122.566223	2.122	240.600366	8.779
Congenital anomaly	482.936882	6.373	676.489094	3.267	711.979702	6.993
Perinatal origin	-45.746183	-0.158	-43.086727	-0.064	405.167764	1.201
Inn-defined condition	386.934736	18.391	563.635153	9.93	510.829607	18.936
Hypertension	-147.98501	-5.379	-154.804724	-2.142	-197.904635	-5.735
Stroke	147.691925	3.694	287.814509	2.762	510.779965	10.477
Mental problems:						
Mental disorder	112.155465	1.403	71.771427	0.355	135.866854	1.36
Senility	-29.708095	-0.329	62.586556	0.267	100.55756	0.872
Alcoholic psychosis	-550.017754	-1.317	-300.450006	-0.274	-924.831016	-1.617
Drug psychosis	-334.862332	-0.892	-264.863931	-0.262		
Transient organic	-257.659531	-1.696	235.196257	0.569	55.41836	0.302
Other organic psychosis	-64.875049	-0.404	162.630134	0.358	441.95205	2.216
Schizophrenia	230.220329	1.171	13.280846	0.026	699.338201	2.714
Affective psychosis	-134.746001	-1.158	-41.341384	-0.137	-6.078777	-0.042
Paranoid state	-170.02655	-0.336	1378.11079	1.01	-640.08515	-1.351
Other nonorganic	75.06118	0.735	113.593126	0.428	178.583487	1.455
Psychoses of childhood			-624.643657	-0.147	-1822.380362	-1.25
Neurotic disorder	25.054249	0.284	93.32063	0.412	-29.402554	-0.259
Personality disorder	-317.975617	-0.634	-686.480556	-0.508	-447.051593	-0.652
Sexual disorder	-308.031403	-0.911	-493.326132	-0.717	-427.203601	-1.036
Alcohol dependence	-519.51845	-1.455	-149.535509	-0.158	-120.585145	-0.287

Table 9-9b: Outpatient payments by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-622.83624	-1.236	1545.098483	0.927	-1289.505597	-1.086
Nondependent drug abuse	589.010755	1.837	-334.004166	-0.487	112.291658	0.293
Psychophysiologic	145.351359	0.443	42.026153	0.038	480.974557	0.84
Special syndrome	-26.645245	-0.152	120.434491	0.264	365.326676	1.775
Acute reaction to stress	-470.876363	-1.797	546.899096	0.703	-121.446841	-0.248
Adjustment reaction	370.86354	1.872	242.025288	0.5	175.046925	0.785
Nonpsychotic brain prob.	102.274412	0.855	232.525128	0.693	-143.991508	-0.792
Depression	-192.15667	-1.729	-21.306399	-0.079	32.760113	0.234
Conduct disturbance	-560.415385	-0.931	-794.158886	-0.524	1204.927878	2.538
Emotional disturbance	-645.755132	-0.407				
Hyperkinetic syndrome	-464.363222	-0.508	1762.242284	0.415	-1106.110029	-0.763
Development delay	-817.533301	-0.517	-144.007931	-0.048	-263.579709	-0.129
Other psychic factors	-371.662001	-0.573	796.698579	0.416	493.228087	0.414
Physician:						
GP/internist/OBGYN	-13.65962	-0.532	-4.283491	-0.053	-108.970912	-2.824
Neurologist	535.536493	11.926	265.377001	2.18	318.062191	5.476
Psychiatrist	117.713466	1.387	-72.933026	-0.336	173.441141	1.677
Geriatrics specialist	1296.872073	3.158	12.742466	0.032	37.182338	0.249
Psychologist	19.976492	0.043	2217.183581	1.162	-464.626474	-0.32
Clinical psychologist	-193.63387	-0.485	-312.233467	-0.899	376.434146	2.497
Other specialist	138.67905	3.317	207.840678	1.898	160.086144	3.289
R-squared						
		0.059		0.06		0.066
F-statistic						
		29.356		30.054		35.538
Sample size						
		26496		26644		27701

Boldface = significant

Table 9-10a: Inpatient mental charges by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	6.945562	0.097	-217.522519	-2.428	-99.371975	-1.097
Black(=1)	61.867494	2.717	0.35231	0.012	26.164168	0.898
Male(=1)	7.04603	0.546	-14.741462	-0.914	16.247134	0.986
Rural county	4.230672	0.299	46.586659	2.637	27.99901	1.544
Age in year	-0.837487	-0.967	2.190607	2.032	-0.000153	0
Per capita income, county	0.000389	0.268	0.000855	0.474	0.00364	1.964
Physical problems:						
Infectious disease	1.074316	0.049	-9.190107	-0.322	-29.050141	-1
Neoplasms	-9.7552	-0.565	-11.547016	-0.548	-1.339009	-0.061
Metabolic disease	11.057437	0.76	-0.358019	-0.02	56.933052	3.117
Blood disease	76.693723	2.932	34.898227	1.102	110.870262	3.434
Nervous disorder	-2.136943	-0.167	1.851843	0.116	3.914531	0.239
Circulatory disease	-6.672874	-0.407	-45.510964	-2.216	-13.575294	-0.635
Respiratory disease	-6.133875	-0.362	24.046612	1.109	16.780649	0.766
Digestive disease	-32.743654	-2.042	25.695838	1.316	19.382596	0.95
Genitourinary disease	33.783242	2.368	37.887879	2.183	-11.257779	-0.628
Pregnancy, puerperium	633.663112	4.991	-108.130663	-0.641	-228.809919	-1.187
Skin disease	23.135982	1.425	-4.099404	-0.21	-17.539533	-0.855
Musculoskeletal disease	3.468832	0.253	-19.604075	-1.164	-17.990069	-1.04
Congenital anomaly	-28.191697	-0.593	78.503504	1.3	-19.384696	-0.302
Perinatal origin	52.896262	0.292	99.155109	0.505	205.802525	0.967
Inn-defined condition	-4.545079	-0.345	-30.172628	-1.823	-1.857431	-0.109
Hypertension	24.093715	1.397	57.589787	2.733	33.849448	1.554
Stroke	23.588304	0.941	27.02175	0.889	-9.878615	-0.321
Mental problems:						
Mental disorder	-1933.7133	-38.595	-2009.058112	-34.049	-2342.700044	-37.158
Senility	1846.343099	32.604	1744.864135	25.495	1964.391708	26.986
Alcoholic psychosis	3837.885799	14.664	2753.332165	8.602	4461.784127	12.359
Drug psychosis	1852.493018	7.872	533.420145	1.813		
Transient organic	2255.514211	23.68	2255.705643	18.728	3088.736781	26.667
Other organic psychosis	2206.205154	21.921	1759.22187	13.272	1863.810975	14.807
Schizophrenia	1726.832915	14.007	2645.279187	17.618	1727.023965	10.621
Affective psychosis	4001.445257	54.87	3562.844877	40.373	2921.594025	31.678
Paranoid state	11038	34.786	142.951846	0.359	222.572145	0.744
Other nonorganic	1918.3479	29.981	2285.744944	29.515	2128.383819	27.481
Psychoses of childhood			1988.171697	1.604	-909.91886	-0.989
Neurotic disorder	1602.017936	28.977	1502.633454	22.769	1984.611897	27.696
Personality disorder	1846.040081	5.869	-760.070194	-1.93	1792.50819	4.142
Sexual disorder	1872.811444	8.834	1730.310999	8.622	1614.10196	6.201
Alcohol dependence	7892.008296	35.266	5063.995764	18.359	3270.597891	12.348

Table 9-10a: Inpatient mental charges by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	5478.297255	17.343	4256.730571	8.76	6761.175288	9.024
Nondependent drug abuse	965.997984	4.807	2202.562911	11.006	2743.066348	11.329
Psychophysiologic	2269.757557	11.031	2051.514953	6.382	3374.018231	9.343
Special syndrome	1937.614307	17.642	1170.513518	8.808	1864.496846	14.359
Acute reaction to stress	1074.575498	6.543	1280.461898	5.643	1713.436997	5.555
Adjustment reaction	486.087751	3.915	1010.062012	7.15	1794.655025	12.762
Nonpsychotic brain prob.	1435.082687	19.135	1138.055105	11.638	1505.864231	13.12
Depression	2084.654458	29.925	2343.834056	29.912	2334.175108	26.468
Conduct disturbance	866.010651	2.295	411.012381	0.93	2326.915992	7.769
Emotional disturbance	-866.362742	-0.871				
Hyperkinetic syndrome	588.822568	1.028	2014.083677	1.626	7456.523573	8.149
Development delay	1313.105098	1.325	1917.965311	2.186	2284.951625	1.767
Other psychic factors	1441.733346	3.544	752.682474	1.348	-1975.716357	-2.627
Physician:						
GP/internist/OBGYN	6.470146	0.402	14.630893	0.615	4.902403	0.201
Neurologist	264.176967	9.385	251.754103	7.092	171.899628	4.69
Psychiatrist	663.988096	12.48	1034.42846	16.363	1595.620922	24.447
Geriatrics specialist	123.660585	0.48	349.657744	3.018	-27.283607	-0.29
Psychologist	1123.483693	3.89	-1399.847372	-2.515	-1280.279322	-1.395
Clinical psychologist	2257.039065	9.016	2435.945789	24.059	1029.582038	10.824
Other specialist	8.673462	0.331	0.36037	0.011	-0.049536	-0.002
R-squared						
		0.325		0.255		0.212
F-statistic						
		226.909		162.328		135.545
Sample size						
		26496		26644		27701

Boldface = Significant

Table 9-10b: Inpatient mental payments by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-6.665856	-0.21	-106.564448	-2.817	-16.100236	-0.388
Black(=1)	22.213167	2.214	-7.420548	-0.622	5.091726	0.381
Male(=1)	2.301278	0.405	-9.514013	-1.397	7.996481	1.059
Rural county	5.003112	0.802	17.670572	2.369	9.451453	1.138
Age in year	-0.234131	-0.613	1.127198	2.477	-0.352616	-0.7
Per capita income, county	0.000211	0.33	0.000188	0.247	0.001109	1.306
Physical problems:						
Infectious disease	-1.192191	-0.123	-6.8907	-0.572	-20.045825	-1.506
Neoplasms	-2.032776	-0.267	-1.512241	-0.17	-0.309358	-0.031
Metabolic disease	2.031411	0.317	-4.329986	-0.573	30.124697	3.599
Blood disease	35.330904	3.066	1.513571	0.113	38.273487	2.587
Nervous disorder	-1.397606	-0.248	2.894794	0.431	3.525818	0.47
Circulatory disease	-1.707668	-0.236	-19.050805	-2.197	-2.436036	-0.249
Respiratory disease	-1.052612	-0.141	10.125141	1.106	8.766238	0.873
Digestive disease	-20.185575	-2.858	13.871393	1.682	7.187869	0.768
Genitourinary disease	15.951369	2.538	6.801883	0.928	-1.073927	-0.131
Pregnancy, puerperium	239.032732	4.273	-44.251629	-0.621	-106.447985	-1.205
Skin disease	9.953842	1.391	0.346187	0.042	-6.279667	-0.668
Musculoskeletal disease	1.365877	0.227	-6.198054	-0.872	-3.422915	-0.432
Congenital anomaly	-38.623788	-1.846	18.190117	0.714	-33.149275	-1.126
Perinatal origin	55.040633	0.69	-15.062654	-0.182	197.180636	2.022
Inn-defined condition	-1.450899	-0.25	-12.397782	-1.774	-3.315453	-0.425
Hypertension	9.85256	1.297	27.953193	3.143	14.408288	1.444
Stroke	-7.026522	-0.636	8.033865	0.626	-12.690092	-0.9
Mental problems:						
Mental disorder	-758.690051	-34.373	-795.760529	-31.947	-1087.530329	-37.638
Senility	750.33299	30.076	727.964	25.197	983.835	29.49
Alcoholic psychosis	1127.234347	9.777	1569.754185	11.618	2432.916575	14.705
Drug psychosis	831.886665	8.025	374.968354	3.018		
Transient organic	970.742767	23.134	901.511124	17.73	1398.313516	26.342
Other organic psychosis	873.092576	19.691	815.883893	14.581	1049.703534	18.197
Schizophrenia	750.329945	13.815	964.289147	15.214	748.181261	10.04
Affective psychosis	1543.639919	48.048	1362.195501	36.565	1255.849103	29.711
Paranoid state	4957.115528	35.462	405.113747	2.411	44.719959	0.326
Other nonorganic	768.137654	27.25	950.468243	29.072	975.680593	27.488
Psychoses of childhood			794.31973	1.518	-511.15113	-1.213
Neurotic disorder	647.186261	26.572	589.677946	21.166	905.114176	27.561
Personality disorder	528.193281	3.812	-343.437051	-2.066	330.120432	1.664
Sexual disorder	733.017866	7.849	729.324229	8.608	751.101309	6.296
Alcohol dependence	3314.972684	33.624	2430.433288	20.872	1731.134358	14.261

Table 9-10b: Inpatient mental payments by year, 1991-1993, cont.

Drug dependence	2183.232109	15.689	1286.40255	6.271	1722.644416	5.016
Nondependent drug abuse	282.681868	3.193	1051.625771	12.448	955.636344	8.612
Psychophysiologic	1015.741461	11.206	709.010107	5.224	1720.796719	10.397
Special syndrome	883.408309	18.258	495.032831	8.824	888.164397	14.925
Acute reaction to stress	410.089004	5.668	524.166742	5.472	1017.550505	7.198
Adjustment reaction	153.767978	2.811	364.769353	6.117	798.983322	12.397
Nonpsychotic brain prob.	549.479502	16.631	516.931819	12.523	921.663154	17.522
Depression	824.50889	26.866	958.527709	28.977	1093.351909	27.052
Conduct disturbance	333.755144	2.007	434.637885	2.33	816.156019	5.945
Emotional disturbance	-342.02207	-0.78				
Hyperkinetic syndrome	191.465477	0.759	788.585957	1.508	3697.733202	8.817
Development delay	512.032191	1.172	773.822787	2.09	1063.421388	1.795
Other psychic factors	554.005316	3.091	328.495122	1.394	-871.170993	-2.528
Physician:						
GP/internist/OBGYN	1.593597	0.225	8.229533	0.82	2.49903	0.224
Neurologist	121.806594	9.823	89.274861	5.958	102.763675	6.118
Psychiatrist	265.74858	11.338	446.906785	16.746	713.776109	23.862
Geriatrics specialist	57.477812	0.507	123.965343	2.535	-43.696671	-1.014
Psychologist	255.994174	2.012	-539.512786	-2.296	-567.82905	-1.35
Clinical psychologist	1165.817174	10.571	875.955611	20.494	475.898734	10.916
Other specialist	4.201635	0.364	5.367946	0.398	3.187899	0.227
R-squared		0.292		0.241		0.213
F-statistic		194.651		150.713		136.11
Sample size		26496		26644		27701

Boldface = Significant

Table 9-11a: Outpatient mental charges by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	1.911685	0.197	2.76779	0.259	-30.21329	-2.361
Black(=1)	6.033862	1.964	-5.086296	-1.507	-0.450715	-0.109
Male(=1)	-0.59495	-0.342	-1.471013	-0.764	-2.40236	-1.032
Rural county	-0.88166	-0.462	3.595485	1.705	-1.031498	-0.403
Age in year	-0.038435	-0.329	-0.018581	-0.144	0.348721	2.244
Per capita income, county	0.000343	1.75	-0.000255	-1.181	0.000526	2.01
Physical problems:						
Infectious disease	3.981398	1.347	0.503279	0.148	4.222149	1.029
Neoplasms	-2.732543	-1.173	1.419257	0.564	-6.61389	-2.144
Metabolic disease	-1.713756	-0.874	1.524992	0.713	-3.040682	-1.178
Blood disease	-3.791706	-1.075	1.998925	0.529	5.759665	1.263
Nervous disorder	1.927428	1.115	2.600723	1.37	-2.076332	-0.897
Circulatory disease	4.487781	2.028	5.250601	2.142	-2.607663	-0.863
Respiratory disease	1.352057	0.591	0.281797	0.109	-4.159696	-1.344
Digestive disease	-0.599963	-0.277	0.224868	0.096	1.938493	0.672
Genitourinary disease	0.620791	0.323	-2.205546	-1.064	-2.229237	-0.88
Pregnancy, puerperium	12.821586	0.749	-9.111857	-0.452	-16.699466	-0.613
Skin disease	-5.222584	-2.384	-2.041446	-0.877	0.317184	0.109
Musculoskeletal disease	-1.753908	-0.95	-2.682014	-1.334	-1.333894	-0.546
Congenital anomaly	1.634932	0.255	-1.623365	-0.225	6.196144	0.682
Perinatal origin	-10.741229	-0.44	28.050304	1.197	-33.660906	-1.119
Inn-defined condition	3.499334	1.967	2.735166	1.384	7.162896	2.978
Hypertension	-4.153637	-1.786	-3.463716	-1.377	-0.76443	-0.248
Stroke	-0.231273	-0.068	-4.006476	-1.104	4.950606	1.139
Mental problems:						
Mental disorder	5.419444	0.802	13.159334	1.868	11.417744	1.282
Senility	28.232843	3.696	71.185774	8.712	58.370005	5.675
Alcoholic psychosis	-41.367686	-1.172	-9.854872	-0.258	-14.198081	-0.278
Drug psychosis	-37.001121	-1.166	44.944479	1.279		
Transient organic	101.707706	7.916	46.901978	3.262	131.937896	8.061
Other organic psychosis	50.051995	3.687	74.452031	4.705	88.469843	4.974
Schizophrenia	332.582627	19.999	106.089117	5.918	437.660048	19.047
Affective psychosis	26.424069	2.686	34.338402	3.259	89.988683	6.905
Paranoid state	-58.386205	-1.364	-70.637181	-1.487	-31.873894	-0.754
Other nonorganic	93.176888	10.796	81.81507	8.849	66.137197	6.043
Psychoses of childhood			-7.372432	-0.05	-341.466874	-2.627
Neurotic disorder	37.986413	5.094	33.749475	4.283	19.608721	1.937
Personality disorder	99.39344	2.343	-45.501974	-0.968	-30.247338	-0.495
Sexual disorder	206.866988	7.234	-7.517473	-0.314	-24.819827	-0.675
Alcohol dependence	22.217007	0.736	204.417347	6.207	178.353364	4.765

Table 9-11a: Outpatient mental charges by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-21.575073	-0.506	369.686764	6.373	-69.764084	-0.659
Nondependent drug abuse	76.132423	2.809	-0.467381	-0.02	118.548914	3.465
Psychophysiology	7.944622	0.286	186.044413	4.847	-48.119019	-0.943
Special syndrome	-10.929076	-0.738	-26.594436	-1.676	11.287429	0.615
Acute reaction to stress	42.45249	1.916	1.629795	0.06	-12.665406	-0.291
Adjustment reaction	4.204839	0.251	-6.98839	-0.414	13.438013	0.676
Nonpsychotic brain prob.	40.688387	4.022	62.283347	5.335	91.780863	5.659
Depression	44.774457	4.765	4.731173	0.506	75.206836	6.035
Conduct disturbance	-1.923561	-0.038	72.635001	1.377	-7.348027	-0.174
Emotional disturbance	-46.864033	-0.349				
Hyperkinetic syndrome	-53.467014	-0.692	-12.819106	-0.087	-118.442162	-0.916
Development delay	0.999591	0.007	-18.195139	-0.174	-6.819514	-0.037
Other psychic factors	-58.674664	-1.069	-9.483043	-0.142	-69.332246	-0.652
Physician:						
GP/internist/OBGYN	-4.335535	-1.999	-2.841928	-1.001	-1.593006	-0.463
Neurologist	-4.202644	-1.107	10.941865	2.582	4.396774	0.849
Psychiatrist	-11.127723	-1.551	-2.440713	-0.323	-13.917456	-1.509
Geriatrics specialist	73.103231	2.105	-11.814456	-0.854	-11.338472	-0.853
Psychologist	63.056711	1.619	-53.982971	-0.812	-100.548648	-0.775
Clinical psychologist	-34.397491	-1.019	-15.45519	-1.279	47.170673	3.509
Other specialist	1.03865	0.294	2.161024	0.567	5.070455	1.168
R-squared						
		0.044		0.034		0.045
F-statistic						
		21.582		16.558		23.626
Sample size						
		26496		26644		27701

Boldface = Significant

Table 9-11b: Outpatient mental payments by year, 1991-1993

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	5.313952	1.13	1.919914	0.36	-13.241388	-1.844
Black(=1)	4.119541	2.766	-1.07109	-0.637	0.319862	0.138
Male(=1)	0.035725	0.042	-0.28327	-0.295	-0.923035	-0.707
Rural county	-1.021889	-1.104	1.612702	1.535	-1.781831	-1.24
Age in year	-0.059022	-1.042	-0.021561	-0.336	0.155954	1.789
Per capita income, county	0.000232	2.438	-6.3182E-05	-0.589	0.000351	2.386
Physical problems:						
Infectious disease	0.483646	0.338	-0.030595	-0.018	2.438665	1.059
Neoplasms	-0.107369	-0.095	0.581896	0.464	-3.87526	-2.239
Metabolic disease	-1.109588	-1.167	0.228417	0.214	-1.816517	-1.254
Blood disease	-1.030413	-0.602	1.628067	0.865	2.898337	1.132
Nervous disorder	1.620128	1.934	1.231769	1.303	-2.000974	-1.541
Circulatory disease	1.629692	1.519	1.99385	1.633	-1.727177	-1.019
Respiratory disease	-0.322926	-0.291	1.109645	0.861	-1.477176	-0.851
Digestive disease	-0.818418	-0.781	0.129808	0.112	1.278268	0.79
Genitourinary disease	-0.044614	-0.048	-0.647072	-0.627	-1.158647	-0.815
Pregnancy, puerperium	4.100169	0.494	-2.70044	-0.269	-5.241193	-0.343
Skin disease	-1.626815	-1.532	-1.230831	-1.061	0.068706	0.042
Musculoskeletal disease	-0.84944	-0.949	-1.24304	-1.241	0.23672	0.173
Congenital anomaly	-0.672891	-0.217	-1.017903	-0.283	0.840205	0.165
Perinatal origin	-2.397153	-0.203	2.919987	0.25	-11.358827	-0.673
Inn-defined condition	1.226968	1.423	0.481274	0.489	3.057862	2.266
Hypertension	-2.067819	-1.834	-1.178083	-0.94	-0.43986	-0.255
Stroke	-0.827233	-0.505	-2.546976	-1.409	3.848719	1.578
Mental problems:						
Mental disorder	4.882978	1.49	7.247437	2.065	20.716916	4.145
Senility	4.084468	1.103	31.417518	7.72	11.55733	2.003
Alcoholic psychosis	-15.039623	-0.879	-27.206953	-1.429	4.217141	0.147
Drug psychosis	-14.543914	-0.945	-1.068353	-0.061		
Transient organic	48.163983	7.733	11.42396	1.595	39.687574	4.322
Other organic psychosis	5.953294	0.905	7.220122	0.916	36.804688	3.688
Schizophrenia	138.586885	17.189	37.588508	4.21	277.970454	21.563
Affective psychosis	1.310655	0.275	7.947493	1.514	25.454008	3.481
Paranoid state	-13.645778	-0.658	-23.767369	-1.004	-56.516843	-2.384
Other nonorganic	18.981473	4.536	15.986245	3.471	5.508881	0.897
Psychoses of childhood			-5.95047	-0.081	-201.100486	-2.758
Neurotic disorder	3.95522	1.094	3.574296	0.911	-13.365341	-2.353
Personality disorder	26.094838	1.269	-22.778747	-0.973	-20.178039	-0.588
Sexual disorder	36.783055	2.653	-4.954573	-0.415	-20.198088	-0.979
Alcohol dependence	-1.626122	-0.111	97.835477	5.965	40.628655	1.935

Table 9-11b: Outpatient mental payments by year, 1991-1993, cont.

Variables	1991		1992		1993	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Drug dependence	-6.895985	-0.334	116.348377	4.026	-23.177638	-0.39
Nondependent drug abuse	1.457394	0.111	-15.312934	-1.287	15.164388	0.79
Psychophysiologic	-2.248045	-0.167	55.385371	2.897	-26.974929	-0.942
Special syndrome	-6.876462	-0.957	-10.822243	-1.369	-8.893084	-0.864
Acute reaction to stress	6.272517	0.584	-2.936597	-0.218	-20.678008	-0.846
Adjustment reaction	-3.455423	-0.426	-5.403685	-0.643	-16.945703	-1.52
Nonpsychotic brain prob.	12.740666	2.598	20.854607	3.586	51.871914	5.701
Depression	10.495702	2.304	-2.745539	-0.589	7.997579	1.144
Conduct disturbance	-5.709778	-0.231	7.349574	0.28	-24.576276	-1.035
Emotional disturbance	-14.331847	-0.22				
Hyperkinetic syndrome	-24.450918	-0.653	-7.202073	-0.098	-43.508607	-0.6
Development delay	-11.723173	-0.181	-7.747103	-0.149	-17.977789	-0.175
Other psychic factors	-29.531016	-1.11	-8.675916	-0.261	-26.144796	-0.439
Physician:						
GP/internist/OBGYN	-2.716911	-2.584	-1.6587	-1.173	-2.148159	-1.113
Neurologist	-1.974971	-1.073	3.066591	1.453	0.815584	0.281
Psychiatrist	4.293047	1.234	1.496038	0.398	0.129538	0.025
Geriatrics specialist	19.479478	1.157	-3.936961	-0.571	-4.671832	-0.627
Psychologist	48.828864	2.585	-21.386115	-0.646	-25.822014	-0.355
Clinical psychologist	-8.544171	-0.522	-0.476106	-0.079	18.978187	2.517
Other specialist	-0.868539	-0.507	1.133092	0.597	3.065086	1.259
R-squared		0.025		0.016		0.037
F-statistic		12.076		7.811		19.344
Sample size		26496		26644		27701

Boldface = Significant

Chapter 10

Cost-Offset: An Exploration of Cost Containment

A Cost-offset for Hypertension, Diabetes Mellitus, and Cancer Among Patients With and Without Depression

Introduction

In this chapter, we explore data for cost containment in three chronic conditions that substantially contribute to higher healthcare costs. According to the cost offset hypothesis, the costs of providing mental health services or alcohol treatment are balanced by subsequent reduction in the costs of treating physical health problems (Zhang et al., 1999). There have been numerous studies examining this hypothesis (Jones and Vischi, 1979; Earll and Kinney, 1982; Ginsberg et al., 1984; Mumford et al., 1984; Robson et al., 1984; Holder and Blose, 1987; Holder and Shachtman, 1987; Mumford and Schelsinger, 1987; Strain et al., 1991; Levenson, 1992; Miranda and Munoz, 1995; Spiegel, 1994; Strain et al., 1994; Friedman et al., 1995; Booth et al., 1996; Davidson, 1996; O'Farrell et al., 1996; Lamprecht, 1996; Simon and Katzelnick, 1997; Holder, 1998; Von Korff et al., 1998; Zhang et al., 1999). However, results have been mixed. A controlled trial by Earll and Kinney (1982), for example, found that treated patients used less psychotropic medication than controls, but had no change in the number of visits to their general practitioner. Robson et al., (1984), observed that patients in a controlled trial used less psychotropic medication and made fewer visits to general practitioner. Ginsberg et al. (1984) observed that treated patients had fewer general practitioner visits, but found no difference from controls with respect to use of psychotropic medications. Miranda and Munoz (1995) observed fewer missed primary care appointments following mental health intervention, but no differences between cases and controls for scheduled medical visits or drop-in appointments. O'Farrell et al. (1996), in a randomized, controlled trial, found no differences in cost-effectiveness for former alcoholics treated with no marital therapy, behavioral marital therapy, or an interactional couples group, except during the active treatment phase, when behavioral marital therapy was more cost effective than interactional therapy.

Mental Health Cost-Offset

Von Korff et al., 1998, assessed the cost-offset hypothesis in two randomized, controlled trials of collaborations between mental health and physical healthcare providers. They found that such care increased depression treatment costs and improved the cost-effectiveness of treatment for patients with major depression. A cost-offset was observed for specialty mental health costs but not medical care costs. Zhang et al., (1999) used descriptive methods to document the association between a \$1.42 reduction in costs for treating physical problems and every \$1.00 spent to provide treatment for depression. Simon and Katzelnick (1997) concluded that although available information suggests the potential for large cost savings through improved treatment of depression, it

does not clearly establish that such savings can be realized. They called for a new generation of experimental studies adapted to assess economic outcomes.

In addition to limitations of study size, case definition, randomization, and economic analysis, two other factors which may have hampered cost offset studies include: (i) lack of clear focus on managing linkages between mental illness and specific physical illnesses; and (ii) time constraints in the traditional primary care setting. Regarding the former, several reports have linked depression with failure of adherence to non-mental health treatment recommendations (DiMatteo et al., 1992; Frasure-Smith et al., 1993; Allison et al., 1995; Carney et al., 1995; Mohr et al., 1997; Ginsberg et al., 1997; McDermott et al., 1997; Zigelstein et al., 1998). These reports have considered the medical and economic implications for coronary heart disease and alcohol and drug abuse and have also explored cancer, and multiple sclerosis. Not only does it appear that depression is associated with poor adherence, but also that treatment of depression improves adherence to non-medical treatment and hence outcomes. Cost offset should therefore have the greatest potential when aimed at conditions requiring substantial patient collaboration (i.e., life style modification, medication, and proper medical care utilization). Moreover, the problems for which cost offset is targeted should be of sufficient prevalence to be both manageable with a relatively small number of healthcare personnel using focused healthcare guidelines. Without such conditions, the impact of cost-offset trials (e.g., those which simply treat depression regardless of the patient's comorbidity) might be diluted. Regarding the problem of time constraints, Gottlieb (1996) noted that even though one half to two thirds of all psychiatric care delivery to older adults is by primary care providers, "The time constraints and economic incentives inherent in primary care practice settings limit the availability of adequate time to perform assessments and to distinguish disorders of behavior from concomitant physical illnesses." To remedy this problem, investigators have sought collaboration between primary care and mental health providers to treat patients with depression (Brown and Schulberg, 1995; Katon et al., 1995). Unfortunately, such programs may have been adversely affected because traditional primary care physicians not only lack the time, training, and/or inclination for mental healthcare, they also fail to provide preventive services (Kottke et al., 1993; Levine, et al., 1999). Without attention to needed life style changes and education as to appropriate medical care utilization, the benefits of successful treatment of depression may be diffused.

Exploring Cost-Offset in Medicare Data

As a preliminary step to determining whether new approaches to the cost offset hypothesis which account for these potential barriers might yield clearer results, this chapter describes Medicare expenditures for beneficiaries with hypertension, diabetes mellitus, and cancer. For each illness, beneficiaries are further dichotomized as to the presence or absence of depression. We hypothesized that if future cost offset studies were specifically linked with chronic problems requiring adherence to both life style and treatment regimes, the potential for benefits might be greater than if the patient had a problem for which self-medication and life style were less important — even if cost

offset were successful in both situations. Hypertension and diabetes mellitus were chosen as examples of the former, while cancer was chosen as an example of the latter.

Medicare Elderly Data

A five percent random sample of Tennessee Medicare beneficiaries who received services on at least one occasion during the years 1991, 1992, and 1993 was drawn by the United States Health Care Financing Administration (HCFA). Persons with any other mental health diagnoses were excluded from these analyses, so that those without depression had no other known mental illness and those with depression had no known mental comorbidity. In all, there were 12,114 with a diagnosis of hypertension alone, 207 with diagnoses of both hypertension and depression, 4,640 with a diagnosis of diabetes mellitus alone and 81 with both diabetes mellitus and depression and, finally, 6,024 with cancer versus 105 with diagnoses of both cancer and depression.

Statistical Analyses

Utilization rates were expressed in terms of number of hospital discharges per 1,000 person-years and number of physician visits per person-year. One person-year was credited for each year the beneficiary was shown to have received benefits during 1991, 1992, and/or 1993. Bivariate and multiple regression analyses were performed; for the latter, non-mental expenditure was used as the dependent variable and individual values for age, gender, race and residence within or without a Standard Metropolitan Statistical Area (SMSA) and comorbidity as the independent variables. Included in the analysis were African American females with an average age of 62.8 years and white females aged 60.6 years. Corresponding age values by race for males were 75.9 and 74.9 years.

Cost-Offset For Hypertension, Diabetes, and Cancer

Table 10-1 shows cost and utilization data for patients with hypertension, diabetes mellitus and cancer and no mental health disorders contrasted with cost and utilization data for beneficiaries with these same three diagnoses plus mental depression. For beneficiaries with hypertension alone, the average yearly non-mental health costs for 1991-1993 were \$6,777 while the corresponding value for beneficiaries with both hypertension and depression was \$10,304 ($p < .05$), a difference of \$3,527 per elderly person. For the 207 patients with depression and hypertension, this equates to a difference of \$730,089. Given that this represents data from a 5% random sample, the overall projected difference would be \$14,601,780 for 4,140 beneficiaries. Similarly, for patients with diabetes mellitus alone, the average yearly non-mental healthcare cost was \$9,969, while for beneficiaries with diabetes and hypertension, this equates to a difference of \$14,096 ($p < .05$), a difference of \$4,127 per person and \$334,287 for the 81 patients with both diabetes mellitus and depression; the projected difference was \$6,685,740 for 1,620 patients. In contrast, there was no statistically significant difference in non-mental health costs for cancer patients with and without depression. Costs for patients with cancer alone were \$10,152 and for cancer with depression, \$12,384, differences of \$2,232 per person and \$234,360 for the group as a whole. The projected difference was \$4,687,200 for 2,100 patients.

**Table 10-1: Mean cost of diagnosis by depressive disorder,
Tennessee medicare beneficiaries, 1991-1993**

Diagnosis	No Depression	Depression
Hypertension +	(n=12,114)	(n=207)
Total Cost	\$6,777	\$10,484*
Total Non-Mental Cost	\$6,777	\$10,304*
Inpatient Days	2.6	4.6*
Total Non-Mental Inpatient Days	2.6	4.4*
Physician Visits	15.3	23.4*
Outpatient Visits	1.9	3.1*
Diabetes +	(n=4,640)	(n=81)
Total Cost	\$9,969	\$14,096*
Total Non-Mental Cost	\$9,969	\$14,049*
Inpatient Days	4.1	5.5
Total Non-Mental Inpatient Days	4.1	5.5
Physician Visits	19.3	27.8*
Outpatient Visits	2.6	4.0*
Cancer +	(n=6,024)	(n=105)
Total Cost	\$10,152	\$12,420
Total Non-Mental Cost	\$10,152	\$12,384
Inpatient Days	4.4	4.5
Total Non-Mental Inpatient Days	4.4	4.4
Physician Visits	19.8	26.8*
Outpatient Visits	2.5	3.9

* Significant at $p \leq .05$; + Beneficiaries with mental health diagnoses other than depression were excluded from these analyses.

For each diagnosis, the average yearly mental healthcare costs were very small: \$80 per year for those with hypertension and depression; \$47 per year for those with diabetes mellitus and depression; and \$36 per year for those with depression and cancer. For patients with hypertension (versus hypertension and depression), there were

statistically significant differences for inpatient days (2.6 versus 4.6 days), non-mental inpatient days (2.6 versus 4.4), physician visits (15.3 versus 23.4), and out-patient visits (1.9 versus 3.1).

For patients with diabetes mellitus (versus diabetes mellitus and depression), there were statistically significant differences for physician visits (19.3 versus 27.8) and out-patient visits (2.6 versus 4.0). For cancer, there were only statistically significant differences for physician visits (19.8 versus 26.8).

Lastly, by way of confirmation, multiple regression analyses were done using non-mental health costs as the dependent variable and age, gender, race, and presence or absence of depression as independent variables. As was true for the preceding analyses, depression was an independent predictor of non-mental costs for both hypertension ($p < .001$) and diabetes mellitus ($p < .05$), but not for cancer.

Summary and Conclusions

The data presented are consistent with the interpretation that improved management of these Medicare beneficiaries with both depression and selected chronic non-mental illness could be associated with decreased non-mental healthcare costs. In these data, for example, cost-equalization for hypertensive patients with and without a known diagnosis of depression, would have yielded savings in excess of \$14,000,000 per year. Given that there were 12,114 hypertensive patients in these data with no known mental abnormalities (including depression), it is likely that the actual savings for cost-equalization could have been even greater.

At the same time, these data suggest that simply assuring aggressive treatment for all depressed patients might produce less cost-offset than more focused management programs. Specifically, in these data, there were no statistically significant differences in either total costs or non-mental costs for cancer patients, with and without depression, while there were statistically significant differences for corresponding patient groups with hypertension and diabetes mellitus. This is consistent with the interpretation that cost-offset may be greater when aimed at patients with non-mental health problems whose successful treatment requires considerable self motivation — not only with respect to taking medication, but also as regards changes in life style and possibly other factors.

The present data are also interesting in that they show very little cost for treating mental illness, even among patients known to be depressed — \$80 per year for patients with hypertension and depression, \$47 per year for patients with diabetes mellitus and depression, and \$36 per year for patients with cancer and depression. Based on previous studies (e.g. Gottlieb, 1996), it is tempting to speculate that this represents under treatment. Whether or not this is true, however, the present findings suggest that careful management of depression would be required to assure that potential cost offsets for non-mental illness are not obliterated by increased mental health costs.

The present data have several limitations. First, the identification of depression is limited to patients with a specific diagnosis. It is not possible to tell whether or not

patients in the hypertension-only group should have been classified as having depression, or perhaps some other mental health problem. As alluded to above, however, it is likely that such misclassification would have lead to an under-estimate of potential cost offset savings. Additionally, the present data are limited to persons in the Medicare age group. It is probable that cost offset potentials among younger patients would be lower, in part because the likelihood of hospitalization for non-mental illness might be less. Further, the Medicare Claims file only includes information about beneficiaries able to make Medicare Part B payments. As such, the poorest of the poor are under-represented in this data set. Finally, the present data represent a sample of Medicare recipients from Tennessee. The comparability of experiences in Tennessee with those of patients from other parts of the U.S. Healthcare system is hard to predict.

In conclusion, the present data support the possibility of significant cost offset for the treatment of depression. In order to realize this potential, however, the data suggest the need for a targeted, prevention-minded, program which can overcome the many barriers inherent in traditional curative primary care services.

References

- Alexopoulos, G. S., Young, R. C., Meyers, B. S.: Geriatric depression: Age of onset and dementia. Biol Psychiatry, 34 (3): 141-5, 1993.
- Allison, T. G., Williams, D. E., Miller, T. D. et al.: Medical and economic costs of psychologic distress in patients with coronary artery disease. Mayo Clinic Proc. 70: 734-742, 1995.
- Andersen, K., Lolk, A., Nielsen, H., Andersen, J. et al.: Prevalence of very mild to severe dementia in Denmark. Acta Neurol Scand. 96(2): 82-7, 1997.
- Aneshensel, C., Frerichs, R. and Huba, G.: Depression and physical illness: A multiwave, nonrecursive, causal model. Journal of Health and Social Behavior 25 (4), 350-371, 1984.
- Barnett, E., Armstrong, D. L. and Casper, M. L.: Social class and premature mortality among men: a method for state-based surveillance. American Journal of Public Health 87 (9): 1521-25, 1997.
- Bazargan, M. and Hamm-Baugh, V. P.: The relationship between chronic illness and depression in a community of urban black elderly persons. Journal of Gerontology 50B, 2, 119-127, 1995.
- Bazargan, M., Bazargan, S. and Baker, R.: Emergency department utilization, hospital admissions, and physician visits among elderly African American persons. The Gerontologist 38, 1, 25-36, 1998.
- Berkman, L. and Breslow, I.: Health and ways of living. New York: Oxford University Press, 1983.
- Berkman, L. and Syme, L.: Social networks, lost resistance, and mortality: A nine year followup study of Alameda county residents. American Journal of Epidemiology 69, 186-204, 1979.
- Berkman, L.: Assessing the physical health effects of social networks and social support. Annual Review of Public Health 5, 413-32, 1984.
- Berkman, L.: Community mental health services for the elderly. Community Mental Health Review 2 (3), 1-9, 1977.
- Berkman, L.: Physical health and the social environment: A social epidemiological perspective. In L. Eisenberg and A. Kleinman (editors), The Relevance of Social Science for Medicine, 1980.
- Black, B. S., Rabins, P. V., German, P., McGuire, M., Roca, R.: Need and unmet need for mental health care among elderly public housing residents, Johns Hopkins Hospital,

Department of Psychiatry and Behavioral Sciences, Baltimore, MD, 37 (6): 717-28, December 1997.

Blazer, D. G., Kessler, R. C., McGonagle, K. A. and Swartz, M. S.: The prevalence and distribution of major depression in a national community sample: The National Comorbidity Survey. American Journal of Psychiatry 151 (7), 979-986, 1994.

Blazer, D., Crowell Jr., B. A., George, L. K.: Alcohol abuse and dependence in the rural South. Archives of General Psychiatry, 44 (8), 736-740, 1987.

Blazer, D., George, L. K., Landerman, R. et al.: Psychiatric disorders. A rural/urban comparison. Archives of General Psychiatry 42 (7), 651-656, 1985.

Blustein, J.: Medicare coverage, supplemental insurance, and the use of mammography by older women. New England Journal of Medicine 332, 1138-1143, 1995.

Borenstein, D. B.: Perspectives: Does managed care permit appropriate use of psychotherapy? Psychiatric Services 47 (9), 971-974, 1996.

Bourdon, K. H., Rae, D. S., Locke, B. Z., Narrow, W., Regier, D. A.: Estimating the prevalence of mental disorders in the U.S. adults from the Epidemiologic Catchment Area Survey. Public Health Report 107, 663-668, 1992.

Brodsky, H., Luscombe, G., Parker, G., Wilhelm, K., Hickie, I., Austin, M. P., and Mitchell, P.: Increased rate of psychosis and psychomotor change in depression with age. Psychological Medicine 27 (5), 1205-1213, 1997.

Brown C., and Schulberg H. C.: The efficacy of psychosocial treatments in primary care: A review of randomized clinical trials. Gen. Hosp. Psych. 17: 414-424, 1995.

Buckle, J. M., Horm, S. D., Oats, V. M. and Abbey, H.: Severity of illness and resources use differences among white and African American hospitalized elderly. Archive of Internal Medicine 152, 596-603, 1992.

Burnette, D. and Mui, A.: Correlates of psychological distress among old-old Hispanics. Journal of Clinical Geropsychology 3 (3), 227-244, 1997.

Burns, B. J., Wagner, H. R., Taube, J. E., Magaziner, J., et al.: Mental health service use by the elderly in nursing homes. American Journal of Public Health 83 (3), 331-337, 1993.

Callahan, C. M., and Wolinsky, F. D.: Hospitalization for major depression among older Americans. Journal of Gerontology and Biological Science and Medical Science 50 (4), M196-202, July, 1995.

Carney, R.M., Freedland, K.E., Eisen, S.A., Rich, M.W., Jaffe, A.S. Major depression and medication adherence in elderly patients with coronary artery disease. Health Psych. 14:88-90, 1995.

Chacko, R. C.: Community mental health services to geriatric patients. Southwestern: The Journal of Aging for the Southwest 5 (1), 53-61, 1989.

Clayton, T.: Issues in the delivery of rural mental health services. Hospital & Community Psychiatry 28, 9, 673-676, 1978.

Cohen, C. I., Hyland, K., Magai, C.: Interracial and intraracial differences in neuropsychiatric symptoms, sociodemography, and treatment among nursing home patients with dementia. Gerontologist, 38 (3): 353-61, 1998.

Cohen, C. I., Magai, C.: Racial differences in neuropsychiatric symptoms among dementia outpatients. American Journal of Geriatric Psychiatry 7 (1): 57-63, 1999.

Cohen, J. and Cohen, P.: Applied Multiple Regression/Correlation for the Behavioral Sciences. Hillsdale, NJ, Lawrence Erlbaum Associates, 1983.

Cohen, J.: Effects of distance on use of outpatient services in a rural mental health center. Hospital & Community Psychiatry 23, 3, 27-28, 1972.

Craig, B.: Reaching the elderly through emergency rooms. Aging 362, 29-36, 1991.

Crowell Jr., B. A., George, L. K., Blazer, D. et al.: Psychosocial risk factors and urban/rural differences in the prevalence of major depression. British Journal of Psychiatry 149, 307-314, 1986.

Cypress, B. K.: Office visits to psychiatrists: National Ambulatory Medical Care Survey: United States, 1975-76. Advance data from vital and health statistics; No. 38, Hyattsville, MD., National Center for Health Statistics, 1978.

Davidson, J. R.: Quality of life and cost factors in panic. Bull. Menn. Clin. 60 (2 Suppl. A): A5-A11, 1996.

Davis, W. E.: Race and the differential "power" of the MMPI. 39 (2): 138-40, April 1975.

Dickey, B. and Azeni, H.: Persons with dual diagnoses of substance abuse and major mental illness: Their excess costs of psychiatric care. American Journal of Public Health 86 (7), 973-977, 1996.

DiMatteo, M. R., Hayes, R. D., Sherbourne, C. D.: Adherence to cancer regimens: Implications for treating the older adult. Oncology, 6 (suppl): 50-57, 1992.

Dohrenwend, B. P. and Dohrenwend, B. S.: Social status and psychological disorder: A causal inquiry. New York, John Wiley, 1969.

Dorken, H. and Webb, J. T.: Licensed psychologists in health care: A survey of their practices. In Kiesler, Cummings, and Vandenbos (Editors), Psychology and National Health. 1973.

CMS LIBRARY



3 8095 00006125 5